A McGRAW-HILL PUBLICATION

Chemical Week

Liquid hydrogen starts commercial countdown, is new Saturn fuel. p. 25

Plastic craft ride sales crest. . p. 68

Courting the atom. How states are setting lures for atomic industry . . p. 41

Banish overdesign—and cut your construction costs. Here's how . . p. 51

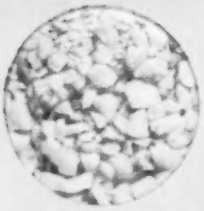
Rail-truck rivalry augurs lower rates, better service for CPI shippers . . p. 79

January 23, 1960

0 cents

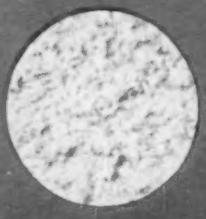
ANN ARBOR MICH
313 N 1ST ST
UNIVERSITY MICROFILMS IN
STEVENS RICE

OUTSTANDING FORMS!



FLAKE. Recently developed for users requiring a product that always flows freely. Dissolves rapidly. No extra cost!

REGULAR GRANULAR. Fast dissolving, yellow-white, crystalline material for a wide range of applications.



45-S GRANULAR. Similar to regular granular form, but preferable when greater resistance to caking in storage is desired.

OUTSTANDING PRODUCT!

U.S.P.

All three forms of anhydrous Solvay® Sodium Nitrite are top quality — U. S. P. All are available in 400-lb. and 100-lb. fiber or steel drums and 100-lb. bags.

SOLVAY SODIUM NITRITE

Sodium Nitrite • Caustic Soda • Calcium Chloride • Chlorine • Chloroform
Caustic Potash • Potassium Carbonate • Sodium Bicarbonate • Soda Ash
Ammonium Chloride • Methyl Chloride • Ammonium Bicarbenate • Vinyl Chloride
Methylene Chloride • Cleaning Compounds • Hydrogen Peroxide • Aluminum
Chloride • Mutual® Chromium Chemicals • Snowflake® Crystals • Monochlorobenzene • Ortho-dichlorobenzene • Para-dichlorobenzene • Carbon Tetrachloride

Allied Chemical

SOLVAY PROCESS DIVISION
61 Broadway, New York 6, N. Y.

SOLVAY branch offices and dealers are located in major centers from coast to coast.

SOLVAY PROCESS DIVISION DP-10A
ALLIED CHEMICAL CORPORATION
61 Broadway, New York 6, N. Y.

Please send without obligation sample or samples as follows:

- ☐ Solvay Flake Sodium Nitrite
- ☐ Solvay Regular Granular Sodium Nitrite
- ☐ Solvay 45-S Granular Sodium Nitrite
  - ☐ Include prices and name of nearest dealer

Name _____

Position _____

Company _____

Phone _____

Address _____

City _____ Zone _____ State _____

ANNOUNCING A NEW ORGANIZATION:

DOW INDUSTRIAL SERVICE

DIVISION OF THE DOW CHEMICAL COMPANY

formed to offer the
CHEMICAL CLEANING SERVICES

formerly provided by

DOWELL

DOWELL DIVISION OF THE DOW CHEMICAL COMPANY

Dow Industrial Service will be an organization devoted exclusively to helping you solve maintenance and disposal problems. It will offer an expanded scope of operations designed to be of greater service to all types of industry.

- The new organization will offer the cleaning services proved in plants throughout the U. S. by Dowell during the past 20 years.
- Chemical cleaning personnel will be the same engineers and operators you have known in Dowell.
- Specialized cleaning equipment will be provided from the same stations and offices — located in major industrial areas.
- The research program which has provided many major advances in cleaning techniques and chemicals will be continued — and expanded.

Dow Industrial Service will welcome the opportunity to discuss your cleaning problems on all kinds of equipment in all industries—steam generators, process equipment, heat exchangers, towers, water and product lines, water wells and tanks.

The new organization will also offer consulting services, and a line of chemical products for use in water and waste treatment.

Dowell will continue to offer services and products to the drilling and producing segments of the oil industry.

For service or more information call the office or station near you. Or write Dow Industrial Service, 20575 Center Ridge Road, Cleveland 16, Ohio.

Chemical Cleaning Services for all industry

DOW INDUSTRIAL SERVICE

DIVISION OF THE DOW CHEMICAL COMPANY

DOW

New Source of Aluminum Sulfate

Liquid, Dry and Iron Free
(All Grades)

DIXON
CHEMICALS

DIXON CHEMICAL AND RESEARCH, INC.
Executive Offices: Bloomfield, N. J.
1260 Broad Street EDison 8-4000

Sales Offices: Bloomfield, New Jersey
Merchantville, New Jersey
Providence, Rhode Island

Chemical Week

TOP OF THE WEEK

JANUARY 23, 1960

Kefauver hearings produce prediction that tranquilizers will comprise 10% of U.S. ethical sales in '60 ..... **p. 26**

The railroad scramble to regain business may mean cost savings, better service for chemical shippers ..... **p. 79**

Soon-to-go-commercial crabgrass killers top list of new weed-control developments ..... **p. 87**

16 LETTERS

16 VIEWPOINT
It's time for the chemical industry to aggressively present a fair image of itself to the public.

16 MEETINGS

21 BUSINESS NEWSLETTER

25 Liquid hydrogen scores major victory in rocket fuel race; sizable market expected in space program by '65.

26 Sales of mental drugs—subject of current Kefauver hearings—may reach 10% of ethical sales in '60.

26 Pittsburgh Plate Glass weighs value of new chemical projects.

28 Synthetic resins ring up top growth rates among CPI products during past decade.

31 WASHINGTON NEWSLETTER

34 RESEARCH
Veteran research executive gives tips on developing research programs, handling personnel.

41 ADMINISTRATION
States launch drives to lure atomic activities. South, New York state are in the vanguard.

42 California concentrates on air pollution: Gov. Brown calls special legislative session to deal with auto exhaust; San Francisco attacks industrial pollution.

44 Lithium Corp. and Quebec Lithium settle contract fight; LCA to pay Quebec $1.9 million.

51 ENGINEERING
"Underdesign" may make it possible to trim 10% from initial plant costs. Here's how one company has been able to do it.

54 GE's new thermoplastic recording technique packs plenty of data in limited space.

59 PRODUCTION
Management probes problem of applying industrial engineering techniques to maintenance.

65 TECHNOLOGY NEWSLETTER

68 MARKETS
Plastics are shaking up boat building industry—'60 output will be 150,000 plastic boats.

72 Jet-engine requirements for synthetic lubes may hike demand for azelaic acid esters.

75 MARKET NEWSLETTER

79 SALES AND DISTRIBUTION
CPI stands to gain from battle between railroads and truckers.

82 CPI leads U.S. industry in acquisition and use of trademarks.

87 SPECIALTIES
Weed-control meeting focuses attention on new crabgrass killers, trends in herbicide forms and formulations.

88 Two major paintmakers acquire companies; third sells out to machinery maker.

94 BUSINESS BENCHMARKS

COVER PHOTO—ROSENFELD

45,363 copies of this issue printed

Vol. 86
No. 4

Chemical Week is published weekly and copyrighted © 1960 by McGraw-Hill Publishing Co., Inc. 330 W. 42nd St., New York 36, N. Y. Place of publication: 3rd and Hunting Park Ave., Philadelphia 40, Pa. Second-class postage paid at Philadelphia. Subscription: $3/year in U.S.A. Send subscription correspondence and change of address to Fulfillment Manager, Chemical Week. Please see page 10 for subscription requirements.

Postmaster: Please send Form 3579 to Chemical Week, 330 West 42nd St., New York 36, N. Y.

THIS WAS HUISKING IN 1910...

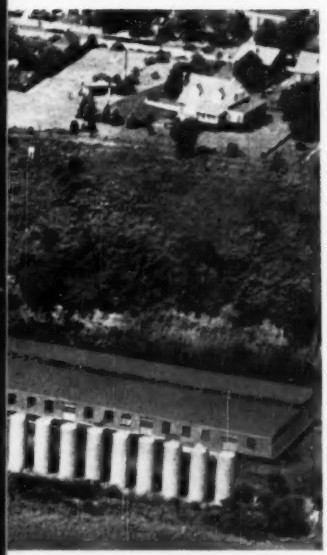
50th Anniversary Report:

THIS IS HUISKING IN 1960

Lyndhurst, New Jersey

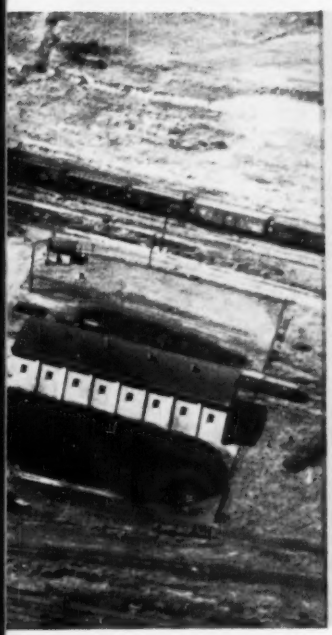
Williamsport, Pennsylvania

How Huisking has kept pace with your need for industrial and fine chemicals



The Huisking story began on January 1, 1910, when Charles L. Huisking opened a drug and chemical brokerage and commission office in New York. After the 1st World War, the firm soon expanded to meet new needs, and became a major factor in the import and export of drugs and special chemicals. Manufacturing operations, on a modest scale, were started in the late 1930's, and when World War II came to a close, plans were drafted to intensify this phase of the Huisking activities. In 1956 the plant was moved to Lyndhurst, New Jersey, and its Clintbrook Chemical Company division was formed. Two years later the Glyco Chemicals division with its plant at Williamsport, Pennsylvania, greatly enlarged Huisking's manufacturing facilities and scope of operation.

Today, Huisking remains a principal factor in import, export, and distribution of pharmaceutical and industrial chemicals. Its manufacturing divisions are steadily increasing operations. Glyco Chemicals division manufactures chemicals for the needs of the food, cosmetic, plastics, paper, electronics, metals, paint and textile industries, expanding its product lists constantly. Peder Devold Oil Company division is a primary source of Cod Liver Oil, Feeding Oils and other Vitamin Oils. Clintbrook Chemical Company division produces Pharmaceutical Chemicals.



GLYCO CHEMICALS

DIMETHYL HYDANTOIN & DERIVATIVES
EMULSIFYING AGENTS
DEFOAMING AGENTS
THE TETRINES®
(Sequestering agents)
POLYHYDRIC ALCOHOL ESTERS
SYNTHETIC WAXES
(Acrawax C)
GLYCOMULS®
GLYOSPERSES®

PEDER DEVOLD OIL CO.

COD LIVER OIL, MEDICINAL
COD LIVER OIL, VETERINARY
DEVOLKOD®
Vitamin Oils
DEVOLD VITAMIN A & D FEEDING OILS
DEVOLD VITAMIN A OILS
WHEAT GERM OIL

CLINTBROOK CHEMICAL CO.

CAMPHOR USP & Technical
CAMPHOR TABLETS
THEOBROMINE SALTS
PROCAINE BASE
PROCAINE HCL
PABA
PARA-AMINO BENZOATE
Potassium & Sodium
ACETIC ACID
ACETONE
ALCOHOL PROP.
METHANOL

CHAS. L. HUISKING & CO., INC.

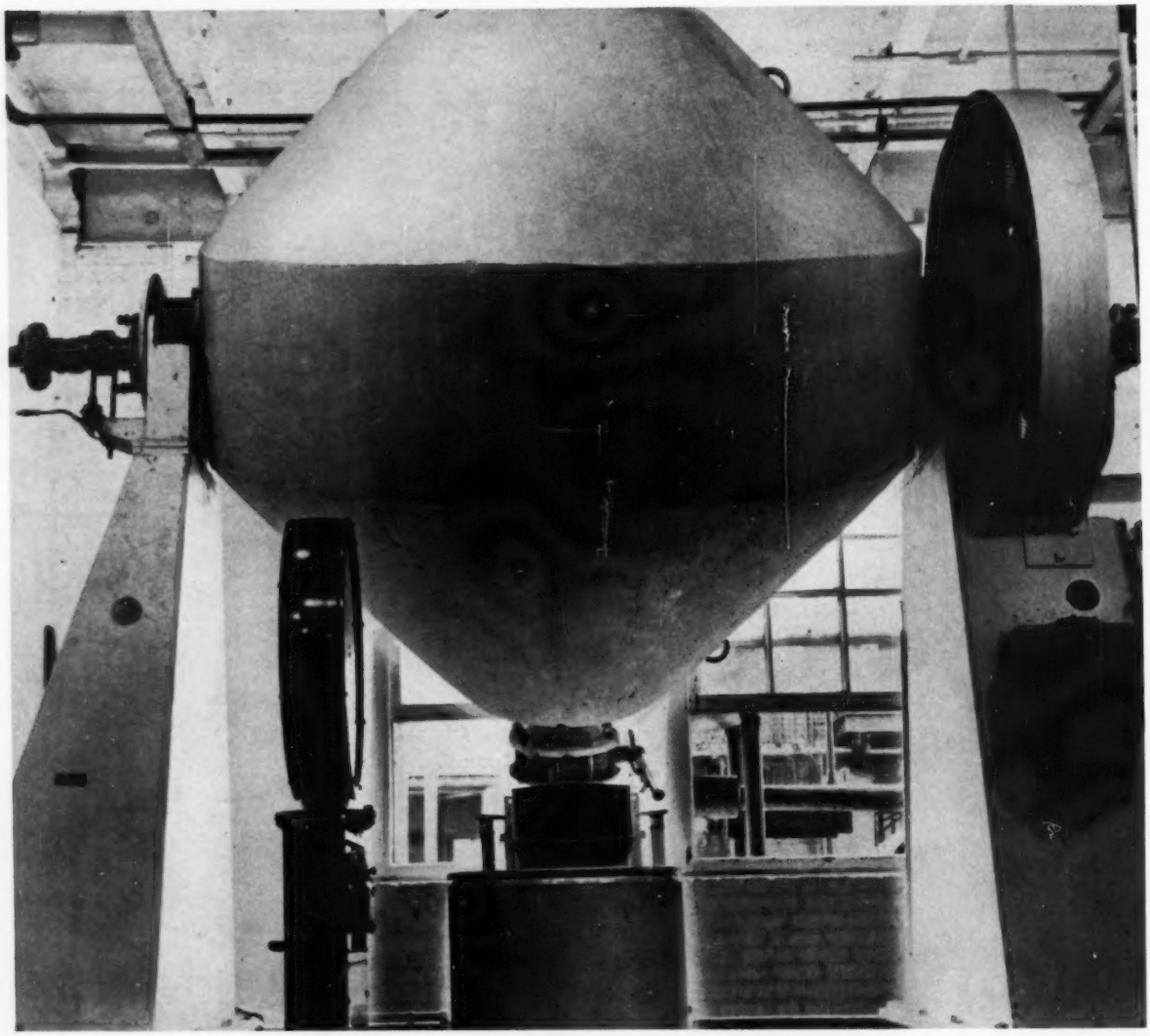
417 Fifth Avenue, New York 16, N. Y. • Telephone: ORegon 9-8400

Cables: HUISKING, NEW YORK
VITAMINE, NEW YORK
GLYCOPON, NEW YORK

Chicago Office:
435 North Michigan Avenue
Chicago 11, Illinois

Since 1910

FLUIDICS* AT WORK



How Merck saves $6400 a year drying and blending powders

Drying and blending simultaneously in a Pfaudler conical dryer-blender is saving an estimated $6400 a year for Merck & Co., Inc.

Merck saves 50% in process time alone. The conical dryer-blender turns out the same quality product in a twelve-hour cycle that 120 conventional tray dryers required 24 hours to accomplish. And a separate blending operation was eliminated.

Further savings result from a sharp decrease in materials handling and saving of pigmented powders previously lost to the process area.

Since the dryer-blender is a closed system, Merck recovers valuable solvent material, also.

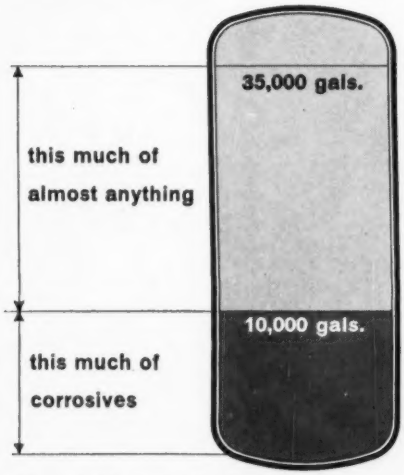
Corrosion-resistant. This dryer-blender is constructed of Glasteel, so Merck can safely process acidic products without fear of corrosion.

A whole chemical plant. You can use this same unit for impregnating, concentrating, reacting, and coating as well as drying and blending—all in a single operation. Such versatility makes possible tremendous savings in capital investment, process time, floor space, and materials handling.

The conical dryer-blender comes in 2′, 4′, 6′, and 8′ I.D. sizes with working capacities from 3 to 165 cu. ft.

Ask for Bulletin 962.

It costs less with Chemstor when you store...



Glasteel Chemstor Tanks actually cost less than stainless steel when you work with volumes between ten and thirty-five thousand gallons . . . 50% less in the 30,000-gallon range. These are savings you can pocket today.

It takes a little longer for the savings to show when you're storing less than ten thousand gallons. But the savings are still impressive, especially when you store corrosives. Savings show up in longer service life, because of the almost universal corrosion resistance of Glasteel. Resists all acids (except HF) and mild alkalies.

And in all sizes you have full advantage of Glasteel's ease of cleaning and ability to protect product purity and flavor.

Sizes range from 500 to 35,000 gallons in vertical or horizontal designs with openings to fit your requirements.

A new specification sheet makes it easier for you to order Chemstor Tanks. You can quickly get one of these sheets from your Pfaudler representative. Write in your capacity needs, openings, valving, etc.

The two- and five-thousand-gallon sizes are stocked for 10-day delivery.

Request Bulletin 975.

Pfaudler Permutit is a world-wide company with manufacturing plants in:
Germany .....Pfaudler-Werke A.G.
Great Britain .....Enamelled Metal Products Corp. Ltd.
Canada .....Ideal Welding Co. Ltd.
Mexico .....Arteacero-Pfaudler, S.A.
Japan .....Shinko-Pfaudler Co., Ltd.
as well as four plants in the U.S.A.

FLUIDICS TURNS WASTE INTO PROFIT

How to side-step a public health hazard ...and step into big new savings

The Homasote Company, Trenton, N. J., makes high-density wood fiber insulation board.

The waste water involved could create a disposal problem and impair the company's good community relations.

The solution? A Permutit Colloidair Separator which turned out to be much more than just a waste treatment system.

Saves product. Colloidair "bubbling out" process raises white water fibers to the surface where they are scraped off and reclaimed.

Saves water. A closed circuit operation with no water wasted, Colloidair clarifies Homasote's water for re-use in pump glands, stuffing box seals, and for clean-up.

Saves heat. The reclaimed water holds most of its heat during the clarifying process, saves cost of heating for re-use.

Easy to use. Colloidair works almost by itself. The operator does little more than periodically charge chemical tanks.

To solve your fluid waste problem. The Colloidair Separator can treat a wide variety of waste liquids including oils, paints, fats and greases as well as white waters. We will gladly run a lab and/or pilot plant test to show how the Permutit Colloidair Separator can serve your plant.

Write for the free Colloidair booklet.

FLUIDICS AND HEAT TRANSFER

Heat Transfer Coefficients for Four Typical Services

Service Coefficients
Btu./(Hr.) (Sq. Ft.) (°F.) and Percentages Referred to Graphite

	Heating Water With Steam	Condensing Organic Vapor With Water	Cooling Organic Liquid With Water	Cooling Viscous Organic Liquid With Water
Stainless steel tube	184 (92.5%)	79 (96.5%)	43 (100%)	18.9 (100%)
Impervious graphite tube	199 (100%)	82 (100%)	43 (100%)	18.9 (100%)
Glass tube	89 (44.7%)	56 (68.3%)	36 (82.5%)	17.3 (91.6%)
Stainless steel reactor	83 (41.7%)	54 (65.2%)	35 (80.9%)	17.0 (89.9%)
Glassed-steel reactor, pipe	71 (35.7%)	48 (58.5%)	32 (73.8%)	16.3 (86.2%)
Film coefficients only, $h_i + h_o$	300	100	50	20

Heat transfer through Glasteel higher than most suspect

A recent article in *Chemical Engineering* by Edward J. Ackley, Pfaudler applications engineer, demonstrates an important fact: *you lose little or no heat transfer efficiency when you use Glasteel for service with viscous, corrosive or dirty fluids.*

Mr. Ackley's findings show that *over-all* coefficients of heat transfer for Glasteel are comparable to those of materials having much higher thermal conductivities.

For example, from the table above, when cooling an organic liquid the service heat transfer coefficient for a Glasteel reactor is 91.3% of that for a stainless steel vessel. If the liquid is viscous, the coefficients for the two materials are *almost identical.*

If you missed the article, just write for Reprint No. 531. *For more information,* write to our Pfaudler Division, Dept. CW-10, Rochester 3, N. Y.

*FLUIDICS is a new Pfaudler Permutit program that provides a modern, imaginative approach for handling and processing liquids and gases more profitably.

PFAUDLER PERMUTIT INC.
Specialists in FLUIDICS . . . the science of fluid processes

Useful products... Many industries... AMOCO CHEMICALS

Six products shown here are part of Amoco Chemicals' line of products that are used by the paint, plastics, petroleum and chemical process industries. There are many more products in the line. We would like to tell you more about them. Please write or call us. Your inquiry will receive immediate attention.

PANAREZ RESINS

For a wide variety of protective coating materials, also in shoe sole stock, floor tile, sealants, rubber parts. PANAREZ Hydrocarbon Resins give finished products many distinctive properties. In addition, they offer opportunities to reduce finished product costs without sacrificing quality.

INDOPOL POLYBUTENES

Ingredient in caulking compounds, adhesives, rubber, special papers, specialized electrical insulation. INDOPOL Polybutenes are available in eight viscosities.

AMOCO AROMATIC ACIDS

Basic ingredients for paints and other surface coatings. AMOCO Aromatic Acids are produced by unique processes in a new plant at Joliet, Illinois.

AMOCO OXO ALCOHOLS

Used in the manufacture of plasticizers for vinyl plastics. Recognized in the industry as leaders in quality and purity.

PANAFLEX PLASTICIZERS

Impart special properties to plastic compounds used in wire insulation, extrusion and plastisol materials. Extend basic plasticizer, thus saving on finished product costs.

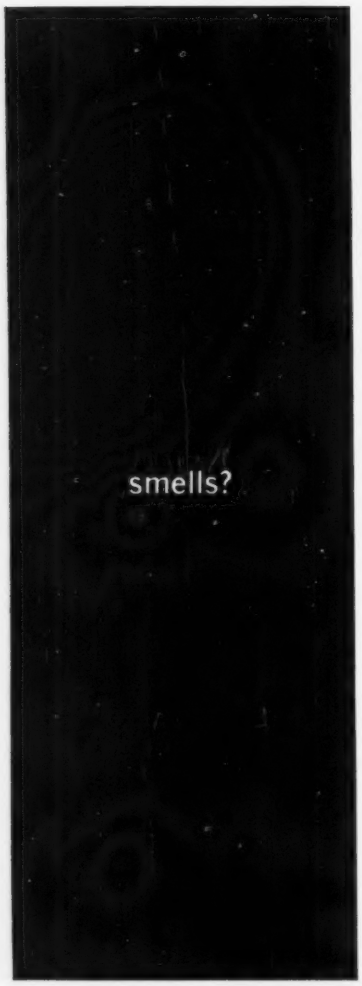
PANASOL SOLVENTS

Paint and Agricultural Chemicals formulators use PANASOL Solvents. Users can select from twelve of these aromatic solvents that have a wide range of properties.

AMOCO CHEMICALS

AMOCO CHEMICALS CORPORATION

910 South Michigan Avenue, Chicago 80, Illinois



Call on Rhodia "Odor Engineering" to solve your malodor problems in plant or product

Rhodia Inc. is the world leader in industrial odor control and reodorization technology and a primary producer of industrial aromatic chemicals. It offers fully qualified consultation service anywhere in the United States without cost or obligation.

RHODIA INC., 32-1
60 East 56 St., New York 22, New York
Gentlemen:
Please send me Rhodia literature.
My problem is: (please give specifics)
_____
_____
_____
NAME_____
ADDRESS_____
CITY_____ STATE_____

RHODIA INC.
60 East 56 St., New York 22, New York
(Phone: PLaza 3-4850)

Chemical Week

Wallace F. Traendly ..... Publisher
Howard C. E. Johnson ..... Editor-in-Chief
Ralph R. Schulz ..... Managing Editor
J. Robert Warren ..... Assistant Managing Editor
Donald P. Burke ..... Associate Editor
Anthony J. Piombino ..... Associate Editor

DEPARTMENTS

Administration ..... Cooper R. McCarthy, *editor;* F. Bryan Williams
Business News ..... Homer Starr, *editor;* Bruce Bendow; Jane B. Munger
Engineering ..... Kenneth C. Wilsey, *editor;* Ryle Miller
Markets ..... Jorma Hyypia, *editor;* Philip A. Cavalier
Production ..... Herbert C. Short, *editor;* Walter E. Andrews, Jr.
Research ..... Joseph F. Kalina, *editor;* Philip A. Untersee
Sales ..... Leo J. Northart, *editor;* Carl A. Hiester
Reports ..... Vincent L. Marsilia, *editor*
Specialties ..... Richard J. Callahan, *editor;* Marion L. Meade
Copy ..... William Mullinack, *editor;* Henry S. Gordon, John Philbin
Art ..... Robert T. Martinott, *director;* Richard Kluga; Dolores Able
Buyers' Guide ..... E. L. Sisley, *editor;* Betsy L. Emery

REGIONAL EDITORS

Chicago: John M. Winton, 520 N. Michigan Ave.
Houston: Thomas H. Arnold, 724 Prudential Building
San Francisco: Emil J. Mikity, 68 Post St.

NATIONAL AND WORLD NEWS

Economics ..... Dexter M. Keezer
Director, News Bureaus ..... John Wilhelm

Atlanta ..... B. F. Barnes
Chicago ..... Stewart Ramsey
Cleveland ..... Arthur Zimmerman
Dallas ..... Marvin Reid
Detroit ..... Donald MacDonald
Los Angeles ..... Kemp Anderson, Jr.
San Francisco ..... Jenness Keene
Seattle ..... Ray Bloomberg
Washington ..... George B. Bryant, Jr.
Correspondents in 75 principal cities.

Beirut ..... O. M. Marashian
Bonn ..... Morrie Helitzer
Caracas ..... John Pearson
London ..... John Shinn
Melbourne ..... Alicja Grobtuch
Mexico City ..... Peter Weaver
Moscow ..... Ernest Conine
Paris ..... Robert E. Farrell
Tokyo ..... Sol Sanders
Correspondents in 78 principal cities.

Robert S. Muller ..... Advertising Sales Manager

Business Department ..... Alvin J. Babkow, *manager*
Sales Promotion Department ..... Fred E. Lesner, *manager*
Market Service Manager ..... Margaret J. Swikart
Advertising Makeup ..... Robert L. Maier
Advertising Salesmen ..... See Adv. Index, p. 92

Paul W. Erb ..... Circulation Manager
Frances Regan ..... Reprints

JANUARY 23, 1960 **Vol. 86, No. 4**

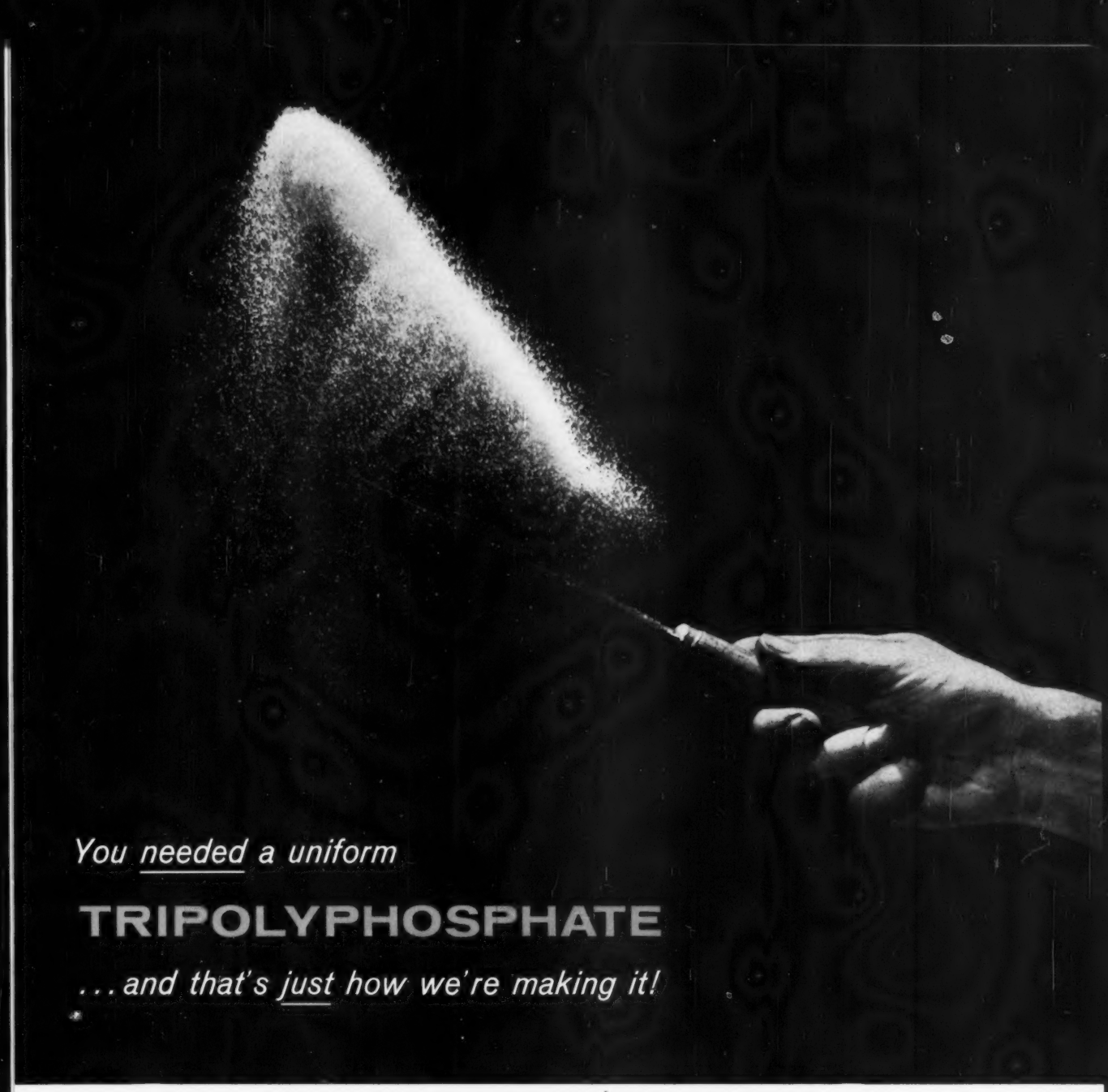
Chemical Week (including Chemical Specialties and Chemical Industries) is published weekly by McGraw-Hill Publishing Co., James H. McGraw (1860-1948), founder. EXECUTIVE EDITORIAL, CIRCULATION and ADVERTISING OFFICES: McGRAW-HILL BUILDING, 330 West 42nd St., New York 36, N.Y. See panel below for directions regarding subscriptions or change of address. Donald C. McGraw, President; Joseph A. Gerardi, Executive Vice-President; L. Keith Goodrich, Vice-President and Treasurer; John J. Cooke, Secretary; Nelson Bond, President, Publications Division; Harry L. Waddell, Senior Vice-President; John R. Callaham, Vice-President and Editorial Director; Joseph H. Allen, Vice-President and Director of Advertising Sales; A. R. Venezian, Vice-President and Circulation Coordinator.

Subscriptions to Chemical Week are solicited from management men in the Chemical Process Industries in administration, production and plant operation, design and construction, research and development, sales and purchasing. Position, company connection and nature of company's business, products and approximate number of employees must be indicated on subscription application. Send to address shown in panel below.

United States and United States possessions subscription rate for individuals in the field of the publication, $3 per year; single copies, 50¢. Foreign subscription rates per year: Canada, $4; other Western Hemisphere countries, $15; all others, $25, payable in advance. Printed in U.S.A. Title registered in U.S. Patent Office.
© Copyright 1960 by McGraw-Hill Publishing Co., Inc. All rights reserved. Unconditional Guarantee: the publisher, upon direct request from any subscriber to our New York office, agrees to refund the part of the subscription price applying to copies not yet mailed.

Send subscription correspondence and change of address to Fulfillment Manager, Chemical Week, 330 West 42nd St., New York 36, N. Y. Subscribers should notify Fulfillment Manager promptly of any change of address, giving old as well as new address, and including postal zone number, if any. If possible, enclose an address label from recent issue of Chemical Week. Please allow one month for change to become effective.

THE BUSINESS MAGAZINE OF THE CHEMICAL PROCESS INDUSTRIES



You needed a uniform

TRIPOLYPHOSPHATE

. . . and that's just how we're making it!

UP-TO-DATE manufacturing equipment and methods make the difference. Every known technical advance has been incorporated into the new "AA Quality" process to provide a sodium tripolyphosphate that is remarkably uniform, chemically and physically.

The pay-off is *yours*—in a highly dependable performance that is passed on to the formulations in which it is used.

We'd like to send you a sample—and we know you will like what you find.

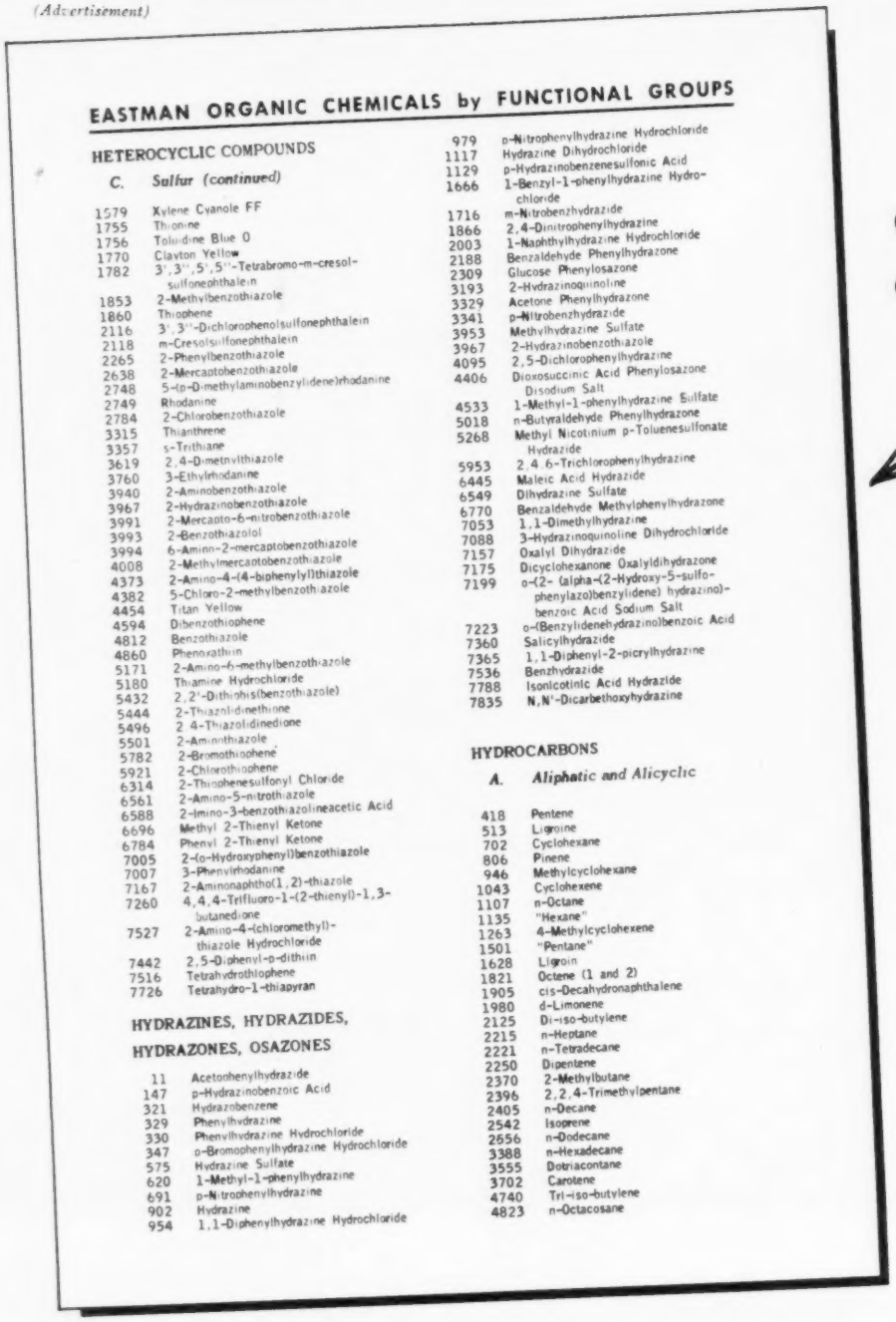
Top detergent quality in every granule...

AA QUALITY SODIUM TRIPOLYPHOSPHATE

AA QUALITY SODIUM TRIPOLYPHOSPHATE
AA QUALITY TETRASODIUM PYROPHOSPHATE
AA QUALITY TRISODIUM PHOSPHATE
AA QUALITY DISODIUM PHOSPHATE

Chemical Division
The American Agricultural Chemical Company
100 Church Street, New York 7, N. Y.

(Advertisement)



EASTMAN ORGANIC CHEMICALS by FUNCTIONAL GROUPS

HETEROCYCLIC COMPOUNDS

C. *Sulfur (continued)*

1579 Xylene Cyanole FF
1755 Thionine
1756 Toluidine Blue O
1770 Clayton Yellow
1782 3',3'',5',5''-Tetrabromo-m-cresolsulfonephthalein
1853 2-Methylbenzothiazole
1860 Thiophene
2116 3',3''-Dichlorophenolsulfonephthalein
2118 m-Cresolsulfonephthalein
2265 2-Phenylbenzothiazole
2638 2-Mercaptobenzothiazole
2748 5-(p-Dimethylaminobenzylidene)rhodanine
2749 Rhodanine
2784 2-Chlorobenzothiazole
3315 Thianthrene
3357 s-Trithiane
3619 2,4-Dimethylthiazole
3760 3-Ethylrhodanine
3940 2-Aminobenzothiazole
3967 2-Hydrazinobenzothiazole
3991 2-Mercapto-6-nitrobenzothiazole
3993 2-Benzothiazolol
3994 6-Amino-2-mercaptobenzothiazole
4008 2-Methylmercaptobenzothiazole
4373 2-Amino-4-(4-biphenylyl)thiazole
4382 5-Chloro-2-methylbenzothiazole
4454 Titan Yellow
4594 Dibenzothiophene
4812 Benzothiazole
4860 Phenoxathiin
5171 2-Amino-6-methylbenzothiazole
5180 Thiamine Hydrochloride
5432 2,2'-Dithiobis(benzothiazole)
5444 2-Thiazolidinethione
5496 2,4-Thiazolidinedione
5501 2-Aminothiazole
5782 2-Bromothiophene
5921 2-Chlorothiophene
6314 2-Thiophenesulfonyl Chloride
6561 2-Amino-5-nitrothiazole
6588 2-Imino-3-benzothiazolineacetic Acid
6696 Methyl 2-Thienyl Ketone
6784 Phenyl 2-Thienyl Ketone
7005 2-(o-Hydroxyphenyl)benzothiazole
7007 3-Phenylrhodanine
7167 2-Aminonaphtho(1,2)-thiazole
7260 4,4,4-Trifluoro-1-(2-thienyl)-1,3-butanedione
7527 2-Amino-4-(chloromethyl)-thiazole Hydrochloride
7442 2,5-Diphenyl-p-dithiin
7516 Tetrahydrothiophene
7726 Tetrahydro-1-thiapyran

HYDRAZINES, HYDRAZIDES, HYDRAZONES, OSAZONES

11 Acetonphenylhydrazide
147 p-Hydrazinobenzoic Acid
321 Hydrazobenzene
329 Phenylhydrazine
330 Phenylhydrazine Hydrochloride
347 p-Bromophenylhydrazine Hydrochloride
575 Hydrazine Sulfate
620 1-Methyl-1-phenylhydrazine
691 p-Nitrophenylhydrazine
902 Hydrazine
954 1,1-Diphenylhydrazine Hydrochloride
979 p-Nitrophenylhydrazine Hydrochloride
1117 Hydrazine Dihydrochloride
1129 p-Hydrazinobenzenesulfonic Acid
1666 1-Benzyl-1-phenylhydrazine Hydrochloride
1716 m-Nitrobenzhydrazide
1866 2,4-Dinitrophenylhydrazine
2003 1-Naphthylhydrazine Hydrochloride
2188 Benzaldehyde Phenylhydrazone
2309 Glucose Phenylosazone
3193 2-Hydrazinoquinoline
3329 Acetone Phenylhydrazone
3341 p-Nitrobenzhydrazide
3953 Methylhydrazine Sulfate
3967 2-Hydrazinobenzothiazole
4095 2,5-Dichlorophenylhydrazine
4406 Dioxosuccinic Acid Phenylosazone Disodium Salt
4533 1-Methyl-1-phenylhydrazine Sulfate
5018 n-Butyraldehyde Phenylhydrazone
5268 Methyl Nicotinium p-Toluenesulfonate Hydrazide
5953 2,4,6-Trichlorophenylhydrazine
6445 Maleic Acid Hydrazide
6549 Dihydrazine Sulfate
6770 Benzaldehyde Methylphenylhydrazone
7053 1,1-Dimethylhydrazine
7088 3-Hydrazinoquinoline Dihydrochloride
7157 Oxalyl Dihydrazide
7175 Dicyclohexanone Oxalyldihydrazone
7199 o-(2-(alpha-(2-Hydroxy-5-sulfophenylazo)benzylidene) hydrazino)-benzoic Acid Sodium Salt
7223 o-(Benzylidenehydrazino)benzoic Acid
7360 Salicylhydrazide
7365 1,1-Diphenyl-2-picrylhydrazine
7536 Benzhydrazide
7788 Isonicotinic Acid Hydrazide
7835 N,N'-Dicarbethoxyhydrazine

HYDROCARBONS

A. *Aliphatic and Alicyclic*

418 Pentene
513 Ligroine
702 Cyclohexane
806 Pinene
946 Methylcyclohexane
1043 Cyclohexene
1107 n-Octane
1135 "Hexane"
1263 4-Methylcyclohexene
1501 "Pentane"
1628 Ligroin
1821 Octene (1 and 2)
1905 cis-Decahydronaphthalene
1980 d-Limonene
2125 Di-iso-butylene
2215 n-Heptane
2221 n-Tetradecane
2250 Dipentene
2370 2-Methylbutane
2396 2,2,4-Trimethylpentane
2405 n-Decane
2542 Isoprene
2656 n-Dodecane
3388 n-Hexadecane
3555 Dotriacontane
3702 Carotene
4740 Tri-iso-butylene
4823 n-Octacosane

a devil of a job

This is a typical page from the new "Eastman Organic Chemicals Classified by Functional Groups."

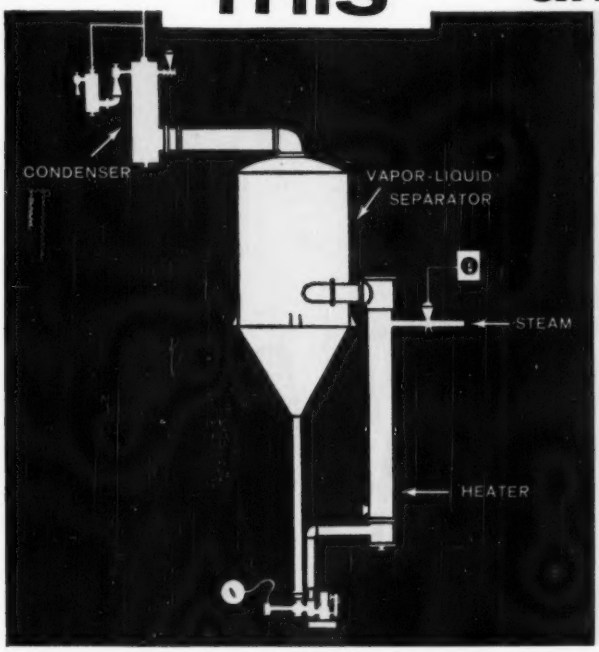
Putting this book together was one devil of a job. It should have been done 25 years ago, but we'd kept putting it off and putting it off.

The job was not done by a committee. One man decided how it ought to be done and issued appropriate orders to his helpers. We hope he has done a good job. Some other chemist would have done it some other way. The other way would have seemed far more sensible to the other chemist. That's the trouble with committees (although they *do* have their uses). If a committee had to agree on the scheme, you would not now be able to obtain a copy of *Eastman Organic Chemicals Classified by Functional Groups* by merely asking **Distillation Products Industries, Eastman Organic Chemicals Department, Rochester 3, N.Y. (Division of Eastman Kodak Company).**

There are some 3700 Eastman Organic Chemicals for laboratory use. To look one up in our regular alphabetical "Eastman Organic Chemicals List No. 41" for availability, package size, price, structural formula, and MP or BP, you must know what specific compound you want and how we interpret *Chemical Abstracts* nomenclatural rules in naming it. This isn't always easy.

Now, if you first consult "... Functional Groups," you see gathered together in one handily comprehensible list all the compounds we offer that contain a given functional group. Each compound appears under each of the functional groups it contains. We think we have done a good thing for chemistry and for business.

THE DIFFERENCE BETWEEN THIS and THIS



is a corrosion-resistant

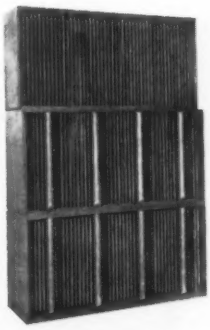
"KARBATE" IMPERVIOUS GRAPHITE TYPE MV ENTRAINMENT SEPARATOR!

The difference between no separator and an efficient "Karbate" entrainment separator on an evaporator is *increased profit and reduced condensate contamination.* A very small product loss in the overhead vapors from an evaporator—even when handling low cost chemicals—adds up to a substantial amount in a year.

For example, a one percent loss of P_2O_5, valued at four cents a pound, is not considered unusual for a phosphoric acid evaporator. An evaporator operating 7,000 hours per year and handling three tons per hour of P_2O_5 will lose roughly $16,800 per year. A large part of this loss can be recovered with a "Karbate" impervious graphite Type MV entrainment separator, paying-out the cost of this equipment – $4,000 including a lead lined transition section or $2,500 with a rubber lined transition section – in a very short period.

In addition to low cost, "Karbate" impervious graphite Type MV entrainment separators offer these features: complete corrosion resistance... high operating efficiency...low pressure drop... simple construction—easily cleaned. For details, write for CATALOG SECTION S-6900.

"Karbate" Entrainment Separator **(Line Type)** View from downstream end showing collector.



"Karbate" Entrainment Separator **(Module Type)** Downstream view of assembly of 12 modules with side plates.

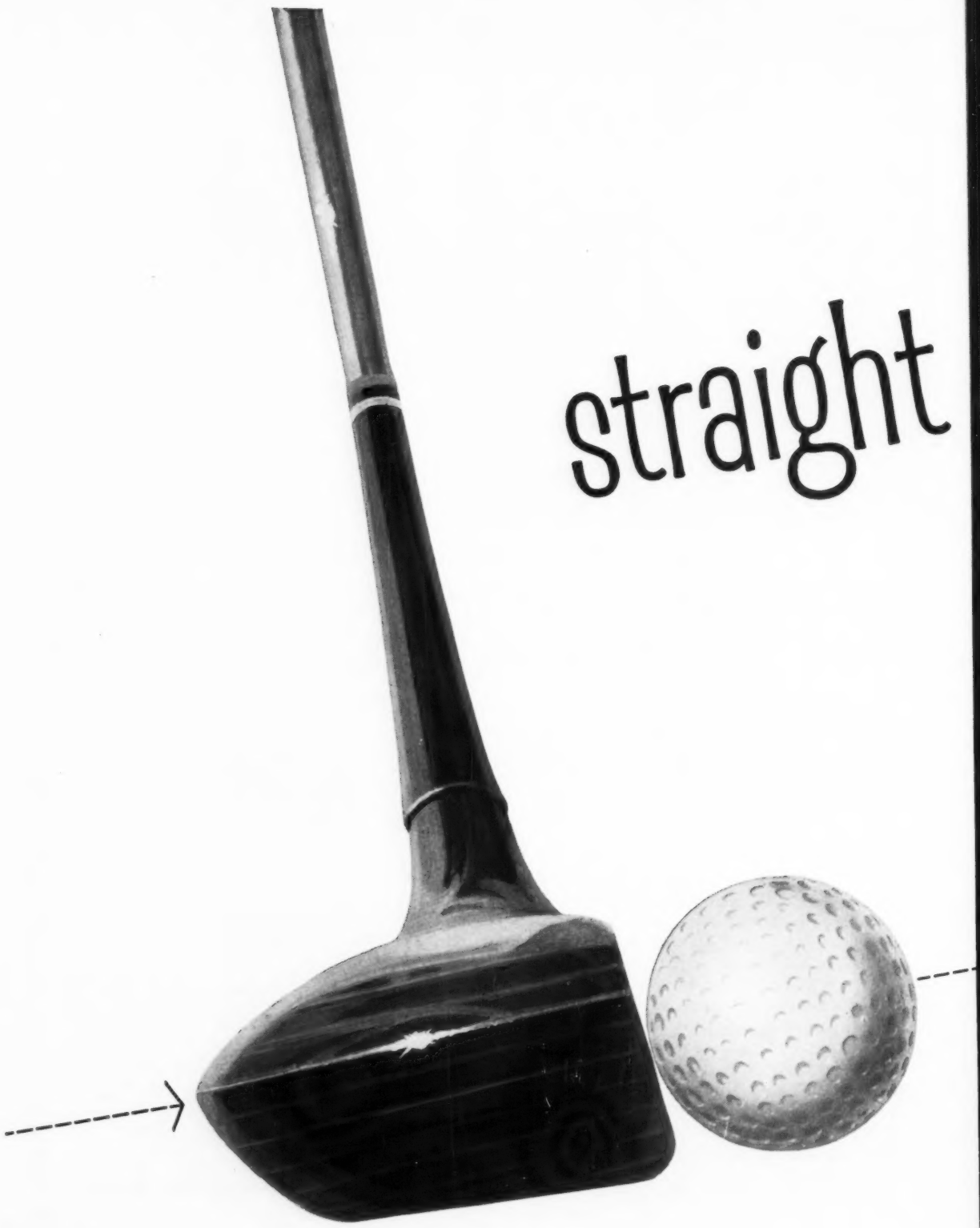
UNION CARBIDE

"National", "Karbate" and "Union Carbide" are registered trade-marks of Union Carbide Corporation

NATIONAL CARBON COMPANY • **Division of Union Carbide Corporation** • ***30 East 42nd Street, New York 17, N.Y.***

OFFICES: Birmingham, Chicago, Houston, Kansas City, Los Angeles, New York, Pittsburgh, San Francisco • **CANADA:** Union Carbide Canada Limited, Toronto

straight



down the middle!

FOR

UNIFORM QUALITY

STEADY SUPPLY

PROMPT DELIVERY

You can depend on Publicker

ETHYL ALCOHOL
ETHYL ACETATE
BUTYL ALCOHOL
BUTYL ACETATE
ISOAMYL ALCOHOL
ACETONE
ACEHALDEHYDE
ACETIC ACID
AMYL ACETATE
REFINED FUSEL OIL
N-BUTYL CHLORIDE

PUBLICKER INDUSTRIES Inc.

1429 WALNUT STREET, PHILADELPHIA 2, PA.

NEW YORK • NEW ENGLAND • MIDWESTERN DISTRIBUTORS, PUBLICKER ALCOHOL & CHEMICAL SALES CORP.

PHILADELPHIA—LOCUST 4-1400 • NEW YORK—OXFORD 5-4160 • BOSTON—HOMESTEAD 9-0022

CHICAGO—RANDOLPH 6-6678

VIEWPOINT

As Others See Us

HOW'S THE CHEMICAL INDUSTRY'S IMAGE these days? Is it a good one—of an industry that's researching and producing useful goods for the public's benefit? Or is it that of an industry that does some good things—but cuts some corners on safety-testing and charges too much for its products? It would be nice to say that the first is correct, to talk like Pollyanna and be glad that the chemical industry is doing so many good things.

But we'd all be fooling ourselves if we thought this was the accurate picture of what the public thinks about the chemical industry. May we suggest that people who have been doing a casual job of reading the papers these days may well see this image:

- The chemical industry cares so little about the public's health that it sells cranberry sprays that cause cancer.
- Producers of drugs are mainly interested in making fantastic profits on the drugs needed by retired people living on a small pension.
- The chemical industry is so interested in making money by selling fluoride rat poisons that it would put them into drinking water.
- Fertilizer makers are so heedless of people's safety that they carelessly ship explosives dangerous enough to destroy square city blocks of homes.
- Chemical companies that make packaging materials don't care whether they're safe enough to meet Food & Drug Administration rules on food additives and packages.
- The chemical industry is feeding us hazardous hormones in the chickens we always thought were safe to eat.

Exaggerated? Yes. We consider each of these statements inaccurate and unfair. But if even a small part of the public believes any one of those statements, the chemical industry has a problem.

We are not alone in this analysis. Did you know, for example, that the daily press was not invited—as it always was in the past—to cover a recent major technical conference on agricultural chemicals? The conference's public relations advisors recommended—wisely, we think—against it. Why? Because there were a few papers on aminotriazole scheduled to be read; and "why risk having the newspapers stir up the whole cranberry episode again?"

Of course, not inviting the newspapers to a conference is no more than a delaying action. And, unfortunately, it may be only the first of several such delaying actions that will be needed in coming months. There's quite a bit of intra-industry controversy that, if it gets into the daily papers, could damage the industry's image still further. Take these two points, for example: the controversy on shipment of fertilizer-grade ammonium nitrate *(CW, Jan. 16, p. 75)*, and the potential scrap over packaging materials—some of which can expect to receive FDA approval under the food additives law before the March 6 cutoff date, and others which can't.

It's time for industry to take the offensive in public relations.

H. E. Johnson

Editor-in-Chief

LETTERS

Add Bishop

TO THE EDITOR: We read with much interest your article "Platinum-Plated Route to Chlorine Savings?" *(CW, Dec. 12, '59, p. 67)*. As the oldest platinum works in the U.S., we have been making anodes and other platinum products for a number of years, having seven different samples on display at the recent Chemshow.

M. A. HATCH
J. Bishop & Co. Platinum Works
Malvern, Pa.

For an update to the Dec. 12 story, see CW Technology Newsletter, Dec. 26, '59.

New Centrifuges

TO THE EDITOR: I read with considerable interest the article "Centrifuges Take a Whirl at New Markets" *(CW, Dec. 12, '59, p. 73)*. . . . at the recent Chemshow we introduced four newly designed centrifugals—two of them completely new designs never before available in the U.S. Of these, the HS-40 machine is designed for 150 lbs. internal pressure, whereas I recall your statement that modern machines are capable of operation up to 125 psig.

W. D. CHAPMAN
Assistant Sales Manager
Chemical Machinery Division
Baker Perkins Inc.

MEETINGS

American Rocket Society, solid propellents conference, Princeton University, Princeton, N.J., Jan. 28-29.

Instrument Society of America, instrument and automation conference and exhibit, Sam Houston Coliseum, Houston, Tex., Feb. 1-5.

Society of the Plastics Industry, Reinforced Plastics Division meeting, Edgewater Beach Hotel, Chicago, Feb. 2-4.

American Society for Metals, metals conference, Fairmont Hotel, San Francisco, Feb. 4-6.

American Institute of Chemical Engineers, national meeting, Biltmore Hotel, Atlanta, Ga., Feb. 21-24.

Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Penn-Sheraton Hotel, Pittsburgh, Feb. 29-March 4.

ADVERTISEMENT—*This entire page is a paid advertisement* *Prepared by U.S. Industrial Chemicals Co.*

U.S.I. CHEMICAL NEWS

Jan. 23 ★ A Series for Chemists and Executives of the Solvents and Chemical Consuming Industries ★ 1960

U.S.I.-International Formed To Serve Markets for U.S.I. Polyethylene Abroad

A new European company has been formed by National Distillers (U.S.I.'s parent corporation) to handle the overseas sales of PETROTHENE® polyethylene resins, and to provide technical service and help in developing markets to customers for polyethylene. The new unit will be called U.S. Industrial Chemicals Co. – International, Division of Sales and Development Company of National Distillers and Chemical Corporation–(International) S.A. Temporary headquarters were opened in September at Kirchenstrasse 13, Zug 1, Switzerland. Permanent headquarters and laboratories will be constructed in Baar, Canton of Zug.

A customer service laboratory will be an integral part of the new company. It will be completely equipped with processing and test equipment designed to meet European standards and operating conditions. The laboratory will be used to demonstrate processing techniques and for research and evaluation studies to help its customers develop new end-use markets and produce improved products. The laboratory will also include polymer testing equipment to insure product quality. The laboratory will service markets in the European countries, including the United Kingdom. Mr. Howard W. Woodham is the Manager of the new Technical Service Laboratory.

Sales Manager of U.S.I.–International is Mr. Kenneth E. Cosslett, who has been U.S.I.'s Assistant Export Manager. According to Mr. Cosslett, U.S.I.–International's PETROTHENE resin sales will be made through established representatives in European countries. The new company will be a supporting unit to help these representatives provide the close technical assistance which the polyethylene market demands.

Woodham

Cosslett

Ruthenocene and Osmocene Found to Have Aromatic Character, Like Ferrocene

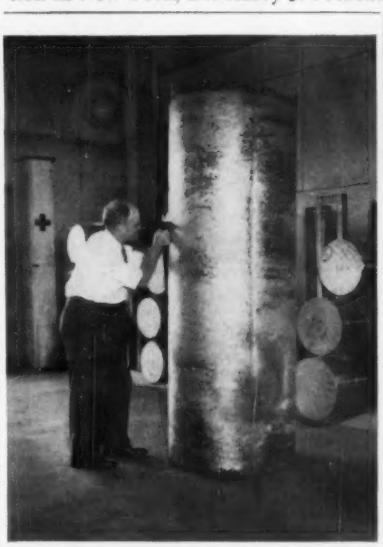
Two more organometallic compounds are reported to behave like aromatics, although the compounds from which they are derived are completely nonaromatic. In this re-

MORE

Methionine Stressed for Cosmetic and Pharmaceutical Use

New Developments Summarized and Current Applications Reviewed in Paper Given at TGA Meeting

At the December meeting of the Scientific section of the Toilet Goods Association in New York, Dr. Harry J. Prebluda of U.S.I. and Dr. Irwin Lubowe of the New York Medical College spoke on the growing uses of methionine in drug and cosmetic formulations. Methionine is an essential amino acid containing sulfur.



World's largest zirconium ingot, 13,200 lbs., gets surface examination at Niles, Ohio, plant of Mallory-Sharon Metals Corporation (owned one-third by U.S.I.). Ingot was melted from zirconium chunklets produced by company's exclusive sodium reduction process. Melting of giant 30-inch ingot is regarded as significant achievement, since cost of strip and sheet products is directly affected by ingot size.

Increased knowledge of methionine's reactions and functions in the living organism has stimulated a considerable amount of interest in the compound. Clinical studies following up on basic biochemical research have pointed to new uses for synthetic DL-methionine in pharmaceuticals and cosmetics. U.S.I. has been a pioneer in the development and use of synthetic DL-methionine by the animal feed and pharmaceutical industries.

Topical Applications

Clinical trials have been conducted with methionine and its derivatives in the topical treatment of various cutaneous diseases with great success. Data on the rate and extent of methionine absorption through the skin indicates nearly half the efficiency of oral feeding. This means that some of the polyfunctional properties of methionine can be utilized by formulators of cosmetics, toiletries and topically applied medications. Commercial preparations containing DL-methionine along with other ingredients for topical use are presently appearing in this country and abroad. Aerosol sprays are also being explored.

A therapeutic compress containing methionine has been formulated which has proven very effective in the early treatment of infectious and eczematous dermatitis. There have been several favorable reports on the value of methionine for wound healing in protein depleted animals and humans.

MORE

Polyurethane Foam Now Used in Bone Surgery

According to recent reports, surgeons can now "glue" broken bones, permitting patients to move a fractured limb while it is healing. Polyurethane foam is the material used, and it has already been tested successfully in hundreds of cases of serious fracture demanding reduction by surgery.

The foam is prepared right at the operating table from sterilized prepolymer and activator, then poured into place by the surgeon. It hardens rapidly, and the patient can move the limb within a few hours. Patients have walked on broken legs so treated in two to seven days after surgery.

The polyurethane foam is quickly replaced by new bone which grows through and around it. No toxic reaction has been reported.

New Data Sheet on Caustic Soda Just Issued by U.S.I.

Specifications, properties, applications and shipping information for caustic soda are detailed in a new data sheet now available from U.S.I.

The material, which U.S.I. ships as commercial grade 50% liquid in tankcars, tank trucks and barges from two plants at Huntsville, Alabama, is used primarily in the manufacture of chemicals, rayon and film, pulp and paper, petroleum derivatives, cleansers, textiles and soap.

The data sheet can be obtained from U.S.I. sales offices or from the Chlorine and Caustic Soda Sales Department, U.S. Industrial Chemicals Co., 99 Park Avenue, New York 16, N.Y.

Jan. 23 ★ **U.S.I. CHEMICAL NEWS** ★ 1960

CONTINUED

Methionine

Oral Use

Many cases of chronic peptic ulcer have been treated with methionine, with good clinical healing results in 80% of the patients. The addition of methionine to infant oral formulas is effective for clearing up cases of diaper rash. Similarly, methionine has been used orally for urine odor control with older patients in hospitals and other institutions. Methionine intake at high levels has been used in the treatment of stubborn urinary tract infections. Stable chemical reaction products from organic acids and methionine derivatives have been prepared which show clinical promise for a series of non-toxic wide-spectrum urinary antiseptics.

Methionine has been used in formulations for treating coronary artery disease in humans. The material also seems to protect biological systems against natural or nuclear radiation. More recently, methionine has been tried in the treatment of schizophrenia in a European psychiatric clinic with excellent results. American workers have already started to explore the possibilities of using methionine by itself or in combination with recognized tranquillizers for the treatment of mental disease and emotional depression brought about by impaired nitrogen metabolism.

The technical presentation before the TGA was documented with 48 references. Reprints can be obtained from U.S.I. on request.

CONTINUED

Organo-metallics

spect they are like ferrocene (dicyclopentadienyliron) which appears to have aromatic reactivity although it is derived from non-aromatic cyclopentadiene.

The materials are ruthenocene (dicyclopentadienylruthenium) and osmocene (dicyclopentadienylosmium), prepared from ruthenium trichloride and osmium tetrachloride plus cyclopentadienylsodium which is a reaction product of cyclopentadiene and metallic sodium. Both ruthenocene and osmocene undergo substitution reactions that are characteristically aromatic. They react with acyl chlorides in the presence of aluminum chloride in a way typical of aromatic Friedel-Crafts reactions. They can be metalated with n-butyllithium to give (after carbonation and hydrolysis) mono- and dicarboxylic acids.

Because all of these metallocenes participate in the Friedel-Craft reaction, it has been possible to prepare novel compounds containing two different metals—ferrocenyl ruthenocenyl ketone, for example.

New Polyethylene-Lined Drums Designed to Ship Liquid Chemicals

A new type of polyethylene-lined drum now available to the chemical industry has an outer pack which consists of wood members reinforced with double-dipped, galvanized steel binding wires and staples. This exterior is said to be corrosion-resistant, and to make the drums lighter, more durable and less expensive than the usual combinations of steel and polyethylene.

The drums have passed MCA-ICC tests for regulated liquids, and can now be used for any liquid safe in polyethylene. This includes corrosive, inflammable and toxic materials.

Photo courtesy Delaware Barrel & Drum Co.

TECHNICAL DEVELOPMENTS

Information about manufacturers of these items may be obtained by writing U.S.I.

Amino-acid resins—a series of ion-exchange resins specially prepared for separation and analysis of amino acids—are now on market. Available in two types for use with fraction collectors or amino-acid analyzers **No. 1550**

Plastics safety handbook now being sold is first such volume devoted entirely to safety ever to be published for plastics processing industry. Many industry processes are specifically treated, giving latest safety methods. **No. 1551**

New portable hydrocarbon detector gives rapid analysis of total organically bonded carbons in gases, with sensitivity better than 0.1 ppm. Can monitor air pollution or lower explosive limits, detect leaks or impurities in systems. **No. 1552**

New catalog offers reprints of technical journals and books long out of print but in great demand. Reprints are reproduced in book form by offset process, and are sold both paper-bound and cloth-bound. **No. 1553**

Mobile vacuum system can now be obtained which is claimed to produce any desired moderate vacuum (250 mm to 0.5 mm) and hold it within ±0.2 mm, in an airtight system. Plugs into any 115-volt, 60-cycle, a-c outlet. **No. 1554**

For painting and decorating polyethylene, new flexible lacquer has been developed. Said to be durable, chip-proof; will not come off with handling. No special treatment of polyethylene needed to make lacquer adhere, it is claimed. **No. 1555**

Measurement of chlorine-in-air in concentrations from ½ to 20 ppm can now be accomplished with new field detector kit. Employs aspirator bulb to draw samples across detector tube of silica gel. Reaction yields blue stain on gel. **No. 1556**

English translations of Crystallography, a bi-monthly publication of the USSR Academy of Sciences, can now be purchased. Offers experimental and theoretical papers on crystal structure, growth, and other phases of the subject. **No. 1557**

PTH (3-phenyl-thiohydantoins) derivatives of amino acids being offered as tools in protein and peptide structure determinations. Used as standards and for comparisons when applying Edman method to study of protein structures. **No. 1558**

New automatic recording vacuum balance can weigh samples in air or inert gases, at atmospheric or reduced pressures, at room or higher temperatures, on balance pan or suspended below balance in a furnace. **No. 1559**

PRODUCTS OF U.S.I.

Alcohols: Ethyl (pure and all denatured formulas); Anhydrous and Regular Proprietary Denatured Alcohol Solvents SOLOX®, FILMEX®, ANSOL®M, ANSOL PR.

Organic Solvents and Intermediates: Normal Butyl Alcohol, Amyl Alcohol, Fusel Oil, Ethyl Acetate, Normal Butyl Acetate, Diethyl Carbonate, DIATOL®, Diethyl Oxalate, Ethyl Ether, Acetone, Acetoacetanilide, Acetoacet-Ortho-Chloranilide, Acetoacet-Ortho-Toluidide, Ethyl Acetoacetate, Ethyl Benzoylacetate, Ethyl Chloroformate, Ethylene, Ethyl Sodium Oxalacetate, Sodium Ethylate, Urethan U.S.P. (Ethyl Carbamate), Riboflavin U.S.P.

Pharmaceutical Products: DL-Methonine, N-Acetyl-DL-Methonine, Urethan USP, Intermediates.

Heavy Chemicals: Anhydrous Ammonia, Ammonium Nitrate, Nitric Acid, Nitrogen Fertilizer Solutions, Phosphatic Fertilizer Solution, Sulfuric Acid, Caustic Soda, Chlorine, Metallic Sodium, Sodium Peroxide.

PETROTHENE® . . . Polyethylene Resins

Animal Feed Products: DL-Methionine, MOREA® Premix (to authorized mixer-distributors).

U.S.I. INDUSTRIAL CHEMICALS CO.
Division of National Distillers and Chemical Corporation
99 Park Avenue, New York 16, N. Y.

U.S.I. SALES OFFICES
Atlanta • Baltimore • Boston • Chicago • Cincinnati • Cleveland
Detroit • Kansas City, Mo. • Los Angeles • Louisville • Minneapolis
New Orleans • New York • Philadelphia • St. Louis • San Francisco

At SOHIO Petrochemical Plant:

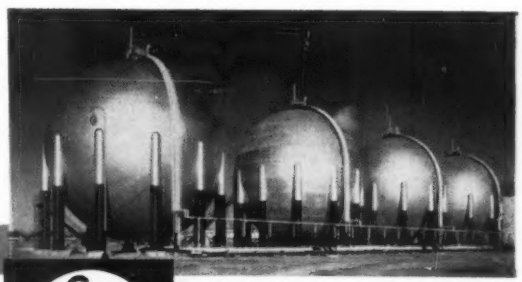
CB&I-Built tanks store 83% ammonium nitrate

Stainless and Aluminum Construction extends useful life of storage structures for ammonia and derivatives

At Sohio Chemical's $17 million ammonia plant, near Lima, Ohio, extensive use was made of stainless steel and aluminum for tanks used to store the highly corrosive products of this new petrochemical operation.

Among other structures, CB&I designed, fabricated and erected the two 80-ft. diameter by 40-ft. high aluminum tanks shown above. They are designed to hold 35,000 bbls. each of ammonium nitrate.

The handling of special metals, including design of structure, fabrication and erection, is a specialty—and an art with CB&I. Our plants are staffed, experienced and equipped to handle special alloys and to fabricate from a variety of cladding materials. Included is Hortonclad®, produced by the CB&I high-strength, vacuum-bonding process. Write our nearest office for further details.



Chicago Bridge & Iron Company

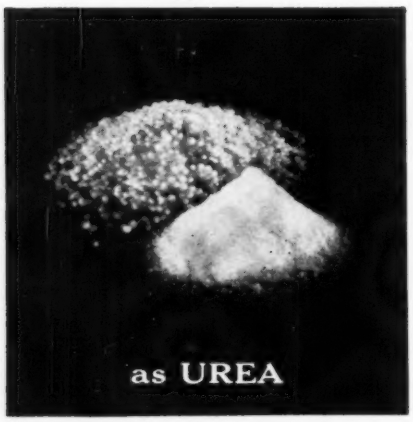
Atlanta • Birmingham • Boston • Chicago • Cleveland • Detroit • Houston
New Orleans • New York • Philadelphia • Pittsburgh • Salt Lake City
San Francisco • Seattle • South Pasadena • Tulsa
Plants in BIRMINGHAM, CHICAGO, SALT LAKE CITY and GREENVILLE, PA.
REPRESENTATIVES AND LICENSEES:
Australia, Cuba, England, France, Germany, Italy, Japan, Netherlands, Scotland

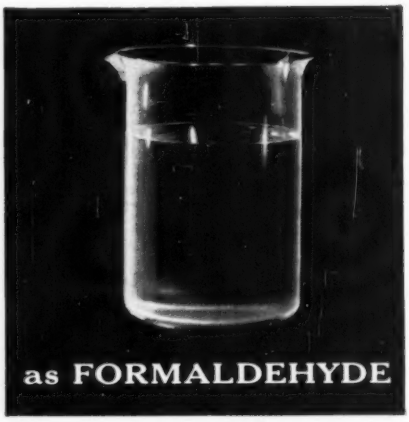
OTHER CB&I STRUCTURES at Lima plant include a 30-foot diam. 304ELC solid-stainless tank for nitric acid storage, aluminum drums for ammonium nitrate solution and the four 20,000 barrel Hortonspheres® above.

C-36CR

BUY UREA AND FORMALDEHYDE WHICHEVER WAY YOU WANT...

separately





or together

Allied Chemical makes it possible for you to buy urea and formaldehyde in whichever form is most convenient for *you*. Separately:

UREA — high-purity crystal and uncoated pelleted, available from *two* producing plants — in South Point, Ohio and S. Omaha, Nebraska.

FORMALDEHYDE —Allied Chemical offers you a full range of concentrations from 37% to 50%.

Or together:

U.F. CONCENTRATE 85 — An easy-to-handle, easy-to-store combination of 60% formaldehyde and 25% urea. Permits larger batches per kettle, shorter cycles, more production from existing equipment.

Write for technical data, prices, delivery information.

For specifications and local offices, see our insert in Chemical Materials Catalog, pages 475-482 and in Chemical Week Buyers Guide, pages 37-44.

BASIC TO AMERICA'S PROGRESS

Allied Chemical

NITROGEN DIVISION
Dept. UF 5-7-1, 40 Rector Street, New York 6, N. Y.
(HAnover 2-7300)

2819

Business
Newsletter

CHEMICAL WEEK
January 23, 1960

Plastics expansions abound—with three in the news this week:

• B. F. Goodrich Chemical Co. is the latest to plan expansion in vinyl plastics. The company is building a vinyl resins and compounds plant at Watson, Calif. (near Long Beach)—its seventh U.S. manufacturing facility, and first west of the Mississippi. Completion target date: second quarter of this year. Capacity was not disclosed.

• Armstrong Cork (Canada) Ltd. also is boosting its vinyl facilities, plans a $2-million vinyl flooring plant for the Montreal area. Production is scheduled for early '61.

• Allied Chemical Corp. this week confirmed the go-ahead on its new, 75-million-lbs./year high-density polyethylene plant. Site: Orange, Tex.—as predicted last spring (*CW Ethylene Report, April 2, '59*). Completion is planned for late this year. Output will be used in making the company's A-C polyethylene pipe compound. The new unit will adjoin an ethylene derivatives plant operated by the company's Nitrogen Division.

And two firms are driving hard to produce polycarbonate high-impact, thermoplastic resin by spring. This week, Mobay Chemical—jointly owned by Monsanto Chemical and Germany's Farbenfabriken Bayer—says its New Martinsville, W. Va. plant is nearing completion, and its polycarbonate product, Merlon, should be in commercial production this spring.

In Mount Vernon, Ind., General Electric Co. is pushing completion of its own Lexan polycarbonate plant—also slated for spring production (*CW, June 6, '59, p. 25*).

Mobay's technical know-how was obtained from Bayer, which has been commercially producing polycarbonates for more than a year. Although GE has applied for patents in this country, it's known that many U.S. firms have been interested in the unusual properties of the resin, may launch production plans at any time.

•

More help is coming on aromatics that have been in short supply the past year:

• Koppers' new naphthalene plant is under construction at Follansbee, W. Va., where the company's Tar Products Division has a coal-tar processing plant. The new facility is designed to produce virtually sulfur-free naphthalene by a "pressure hydrogenation" process not yet used commercially. Completion of the plant is set for the end of '60.

Koppers—already a basic producer of crude and refined naphthalene—says its first major customer will be American Cyanamid, which will use naphthalene in its phthalic anhydride plant at Bridgeville, Pa.

• DX Sunray Oil Co. will produce benzene from petroleum. The refining and marketing subsidiary of Sunray Mid-Continent Oil Co.

(Tulsa, Okla.)—now putting up a $7-million solvent dewaxer to replace present wax facilities at its Tulsa refinery—will also add a $1-million Udex benzene unit; construction will begin March 1, and the plant will go onstream in October.

•

Progress note on Goodyear Tire & Rubber's polyisoprene program: the company has been studying the Houston (Tex.) Ship Channel area as a possible site for an estimated $20-million plant for the "synthetic-natural" rubber. Shell is already producing a similar product at Torrance, Calif., and Firestone's plant is under construction at Orange, Tex.

•

Chemical business in '59 was great despite the steel strike, judging from latest corporate statements and predictions.

• Dow Chemical had its best-yet six months' period between June 1 and Nov. 30—a period that takes in the entire steel strike plus the first three weeks of mill startup. Half-year sales rose 15.2%, compared with summer and autumn of '58, to $393.7 million; and earnings rocketed 60.9%, to $45.1 million.

• Minnesota Mining and Manufacturing estimates that its total sales for calendar year '59 will come to about $445 million. This would represent an 18% gain over '58 volume.

• Metal & Thermit Corp. boosted its sales and earnings, not only for the year as a whole but also for the fourth quarter, although its two biggest customers—the steel and auto industries—were the industries most directly affected by the strike. M&T figures its '59 sales will add up to $40 million (vs. $35.3 million in '58) and earnings will amount to $2.10/share (vs. $1.36 in '58). If there had been no strike, the company estimates, '59 earnings might have been 15¢/share higher.

•

Another attempt to part Du Pont from its General Motors stock will be made by mid-March. As expected (*CW, Oct. 17, '59, p. 35*), the Justice Dept. will file a brief asking the U.S. Supreme Court to reverse the decision of District Judge Walter La Buy at Chicago.

And the feeling in Washington is that the high court will agree to hear arguments on this appeal. In this event, the arguments likely would be scheduled for the court's next term, which starts in October; otherwise, the lawsuit may come to an end by June.

Du Pont President Crawford Greenewalt—who was satisfied with La Buy's ruling that Du Pont could keep its 23 million GM shares but not vote them—calls the government's move to appeal a desire to continue a "vendetta against the million or more Du Pont and GM stockholders."

The Justice Dept. is expected to argue that (1) complete divestment is the only lawful remedy for a stock holding that is in violation of the Clayton Act; and (2) the government's divestment plan would mitigate tax consequences and avoid a crushing impact on the stock's market value.

engineering the future

new ASA symbol
for a roller crusher

Whether you have crushing and grinding problems—or any other process needs—Vitro engineers know how to help These technical men have the background and ability gained by solving hard-to-do problems, as well as routine.
Vitro designed and built a major uranium mill now operating in Salt Lake City. Capacity: 700 tons per day. Process technique — solvent extraction.
Crushing and grinding are an important part of this facility. Vitro engineers planned and built the entire plant. They can serve your needs as well.

Vitro ENGINEERING COMPANY
225 PARK AVENUE SOUTH, NEW YORK 3, N.Y.
A DIVISION OF VITRO CORPORATION OF AMERICA

Aerosol packaging captures 51% of the $73,900,000 cologne market

If your product can be brushed, poured, sprayed or squeezed, this profitable new packaging idea can generate sales for you, too!

Sales of aerosol-packaged colognes reached $37,600,000 in 1958—51% of the $73,900,000 total spent on colognes—and they're still increasing at a rate of over 20% a year.

The reasons for this success are simple. Aerosols deliver the product in a completely new form that's easier, more effective and often more economical to use. If your product can be brushed, poured, sprayed or squeezed, you stand a good chance to add new sales appeal—create vast, new markets—if you package it in an aerosol.

It is not necessary to set up your own packaging line to enter this field. A custom filler near you has the knowledge and equipment to help in every area, from planning through production.

If you don't know the name of a custom filler, write Du Pont. We'll send you a list and include survey data on your market for aerosol products, plus information about Freon* propellents for aerosols. "Freon" is preferred by custom fillers and is used in more of today's aerosols than any other propellent. Write E. I. du Pont de Nemours & Co. (Inc.), "Freon" Products Div. 3301, Wilmington 98, Delaware.

Best-selling aerosols are powered with

FREON®
PROPELLENTS

DU PONT
REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING ... *THROUGH CHEMISTRY*

*Freon and combinations of Freon- or F- with numerals are Du Pont's registered trademarks for its fluorinated hydrocarbon propellents

Chemical Week — January 23, 1960

Liquid Hydrogen's Commercial Countdown

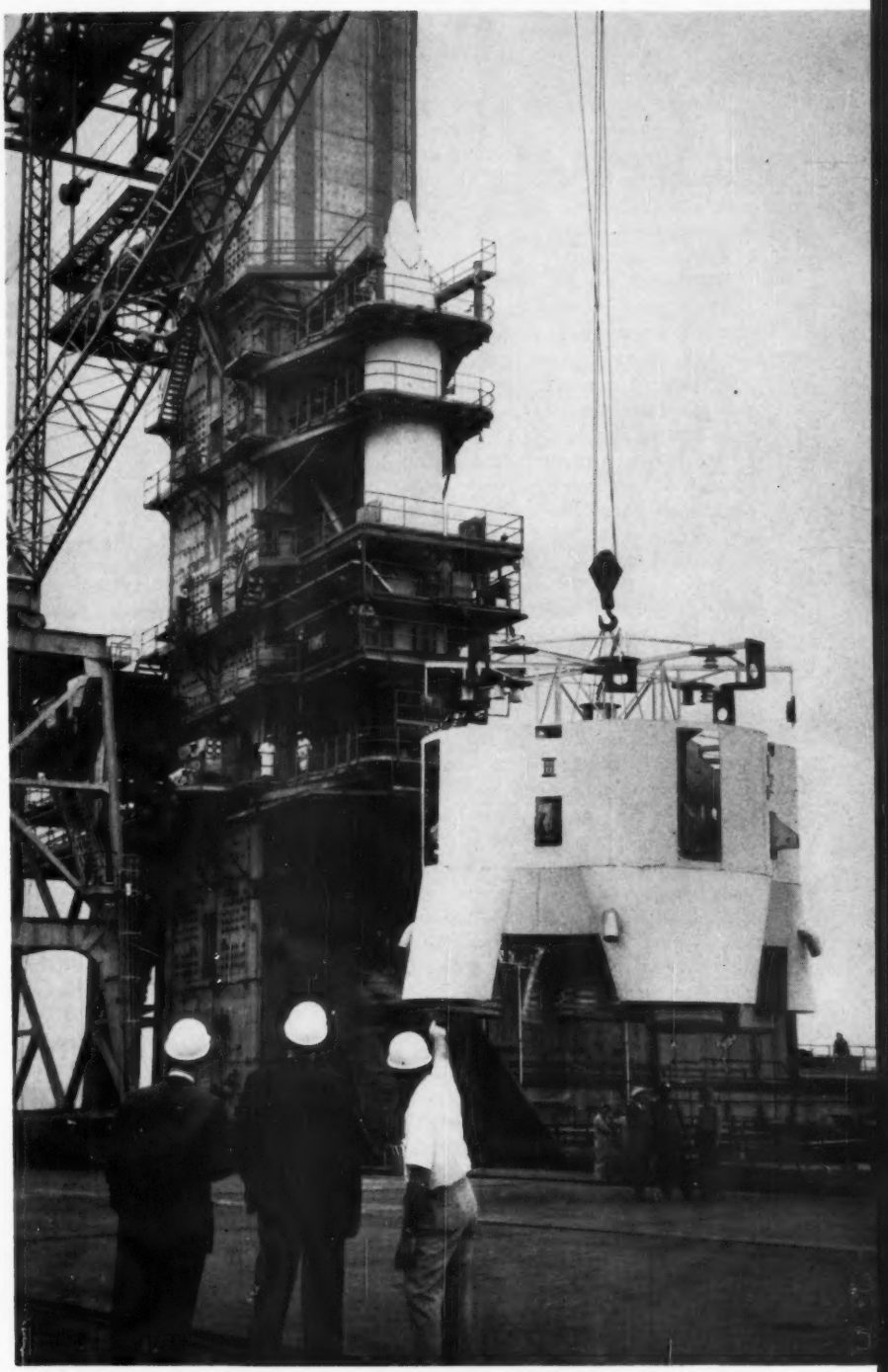
Liquid hydrogen's commercial hopes soared with two big decisions on the U.S. space program last week: (1) The National Aeronautics and Space Administration revealed it was revamping the design of the Saturn space vehicle, the rocket combination on which this country is pinning its hopes of catching up with the Soviet Union in space probes; and (2) President Eisenhower ordered a speedup in development of the Saturn rocket.

Instead of a kerosene-fueled second stage, the Saturn is now slated to have second and third stages powered by clusters of new, 150,000-lb. hydrogen engines—four in the second, two in the third. And instead of a final, third stage made up of a Centaur—a cluster of two 15,000-20,000-lb. liquid hydrogen rockets—the Saturn will use four of these rockets in a fourth stage and two more in a fifth. This leaves only the first stage powered by conventional kerosene-and-liquid oxygen fuel.

Reason for the switch: the liquid hydrogen-oxygen combination yields about 35% more thrust than the kerosene-oxygen mixtures. The newly designed Saturn will be able to launch bigger payloads on more ambitious lunar and interplanetary probes than initially planned. It may be able to carry a man to the moon and back.

Tipping the Odds: In switching to liquid hydrogen, NASA is taking a calculated risk. The originally planned second stage—a modified Titan ICBM—is in a late stage of development. The new, 150,000-lb. hydrogen engines, on the other hand, will have to be started from scratch, are expected to take at least three years to complete. Even the small 15,000-lb. hydrogen rocket hasn't yet been flight tested by its builder, Pratt & Whitney.

Bolstering NASA's confidence are a series of technological developments that add up to a major breakthrough in liquid hydrogen. Until recently, the Air Force referred to the large-scale production, storage and use of liquid



Saturn Mock-up: Switch to liquid hydrogen means heavier loads.

hydrogen as "extremely difficult" and problematical. Its high volatility and extremely low temperatures (minus 423 F) present formidable production, storage and transport problems.

The feasibility of large-scale production has been proved by the 500,000-lbs./year plant Air Products built and put onstream early last year to pipe the fuel to Pratt & Whitney's adjacent plant.

Transportation is still a problem, but not an obstacle. Air Products has been hauling liquid hydrogen long distances from its Painesville, O., pilot plant for almost two years. For large volumes, cross-country hauling is now considered feasible.

Hydrogen's Future: Right now, it seems a good bet that liquid hydrogen will be the work-horse fuel for the U.S. space program until the development of a nuclear-powered engine. That can mean five to ten years —or longer. The AEC-NASA nuclear rocket, Rover, is running on a budget of only $25 million this year— only $3 million over '59—and is still in the experimental stage. And even with the advent of atomic rockets, a large role for hydrogen or some other liquid fuels will still be open —for the first-stage booster, and as the "working" fluid in the actual nuclear rocket.

Competition from other fuels seems remote. Solid fuels seem headed for dominance in the weapons field, but most authorities doubt that they have the power potential for space flight.

But nothing is certain in the space field. The Saturn plans are still only tentative. At least one NASA official tells CHEMICAL WEEK that he is still not completely sold on liquid hydrogen as the ultimate chemical fuel, favors hydrazine.

More Hydrogen Ahead: Even assuming that hydrogen's place is secure, just how much capacity will be required is as unclear as everything else connected with the space program. Ultimately, the need could be substantial. A single 120,000-lb. engine, using liquid oxygen, would consume some 30,000 lbs. of liquid hydrogen in a burning time of three minutes.

Officials differ even on how much capacity will be needed on the projected program. One believes existing capacity will be enough. Another thinks a 20% increase might be needed under current consumption plans, that capacity would have to be tripled if all of the programs are approved in detail.

Right now, Air Products' plant in Florida is the only large-scale producer. This spring, Union Carbide's Linde Division will put onstream its plant at Torrance, Calif. It's committed to supply up to 3.3 million lbs./year—about 80% of output—to NASA.

Liquid hydrogen output, in fact, would be growing even without rocket outlets.

The entire output of Linde's small plant at Tonawanda, N.Y., which went onstream in October, goes to commercial labs within a 500-mile radius. And Linde says it planned to build the Torrance plant in any event —although the NASA contract accelerated the plans—to supply labs conducting cryogenic experiments in fields such as conductivity and structure.

No Chemicals Retreat

Though dissatisfied with current profits from its Columbia-Southern Chemical subsidiary, Pittsburgh Plate Glass is planning to increase its chemical operations during the next few years.

President David Hill won't now say precisely what new chemical projects are under closest study. He did tell CHEMICAL WEEK, however, that they would not necessarily be closely related to present C-S activities. The prime criterion on new chemical ventures, he indicates, will be profitability —and the company is trying to spot future markets, build plants now that will show good rates of return in about five years.

Hill—in New York for an appearance before financial analysts last week—is counting on comebacks in titanium and zirconium.

Several chemical products — particularly Duracron, an acrylic-based coating for aluminum siding and other metal items—are brightening the outlook for the company's paints division, Hill said. Over-all, he looks for per-share earnings to rise more than 20% this year—possibly to as much as $6/share. In '59, earnings dipped 5-10% to an estimated 75¢/-share.

Stormy Session

This week, drug companies again are getting critical scrutiny from Senator Estes Kefauver's antitrust subcommittee in Washington. Current topic: tranquilizers—with prices and profits due for particular attention.

The subcommittee's aggressive staff is leveling much the same charges that were trumpeted in last month's hearings on steroid hormones (*CW, Dec. 19, '59, p. 22*). But tranquilizer producers have prepared a vigorous defense in which they will cite: tranquilizers' therapeutic achievements; competition within industry; costs of discovering, testing, and introducing such products.

Importance of tranquilizers in current medical practice is underscored by 1960 sales predictions: $150 million. Another $20 million will result from sales of these same chemicals tailored for treating conditions ranging from cardiovascular disease to acute vomiting in uremia. The total will account for nearly 10% of the country's total ethical drug market at the retail level. Products are made or marketed by more than 70 companies, and appear on doctors' prescription pads under nearly 100 names.

Also coming into prominence are the psychic energizers or "mood" drugs. However, the market foreseen for these drugs is much smaller than the market for tranquilizers.

Reaching a Plateau: Sales of tranquilizers, which skyrocketed in the middle '50s, are nearing a plateau. Between 1953 (when reserpine was introduced) and 1956, sales of the dozen or so principal tranquilizers shot to more than $100 million. In 1958, sales of tranquilizer drugs for mental treatment were estimated at $130 million. Although Kefauver's staff has tabbed 1959 tranquilizer sales at $200 million, industry men feel that this estimate is high.

And now that tranquilizers are accepted as a standard part of treatment for mental disorders, a saturation point is probably at hand—at least for drugs of the type now available. Future gains by existing drugs, many believe, will depend on population patterns, world "tensions," and operating budgets for mental institutions.

Shaping Up for Tranquilizer Producers

Biggest Sellers: In '59, sales leaders among the more potent types of tranquilizers included Thorazine (chlorpromazine, Smith Kline & French); Prolixon (fluphenazine, Squibb); Pacatal (mepazine, Warner-Chilcott); and Sparine (promazine, Wyeth Laboratories Division, American Home Products). Reserpine is ringing up sales under many product names.

For milder disorders, Miltown from Wallace Laboratories of Carter Products, Inc., and Wyeth's Equanil — both meprobamates — were high on drugstore sales lists, as were Atarax (hydroxyzine) from Pfizer's J. B. Roerig Division and Compazine, a phenothiazine derivative introduced by SK&F in late '56.

A number of "full-range" tranquilizers also are on the market. One of these is Trilofon (perphenazine), a Schering product. The dosage of these tranquilizers is determined by the acuteness of the disorder.

Keenest competition is felt in sales of the milder types of tranquilizer products—a field in which Miltown, Equanil and Atarax take the lead over about 30 similar products put out by 20 companies.

Big Market Risk: There is said to be no real security in the market. Any of more than a dozen producers could take a piece of another company's market at any time. Example: When SK&F introduced Thorazine five years ago, it was cited as "unique." Within one year, Equanil, Miltown and Merrell's Frenquel were introduced. Within two years, SK&F's Compazine went on the market; and in the same year, six additional tranquilizing drugs were introduced. Then 20 more were unveiled in '57; and an additional 50 were introduced to the medical field in '58. The list is still growing.

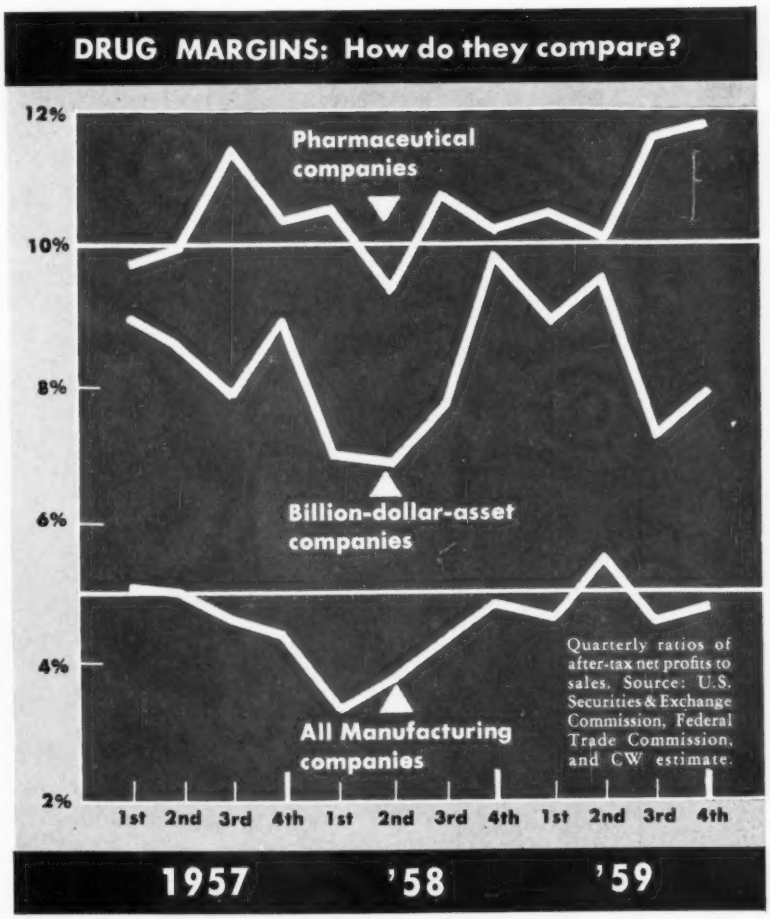
But one point which producers will try to bring out in the Kefauver hearings is this: the smallest difference in molecular structure can make a tremendous difference in the physiological effects. Still, there's a practical limit to what can be done with any given molecule. New mental health drugs of the next decade may well come from brand-new compounds.

Research Budget: Last year the pharmaceutical industry spent about $200 million for research on tranquilizers and all other drugs.

SK&F outlines its '59 R&D costs this way: obtaining the compounds involved outlays of $700,000. About 90% of all compounds are said to wash out in the first look. Of the 200 given a second look by SK&F last year—at a cost of an additional $1.6 million—only about 25 lived up to possibilities suggested in the first screening. Toxicity tests on those 25 cost as much as $15,000 per compound, or $300,000 for the 25. Dosage range tests on the 20 surviving the fourth step were tried in small-scale tests on human patients by leading medical specialists. The company spent $3.5 million in laboratory work on 15 tranquilizer projects. And expenses of clinical testing, the next step, ran to $1.7 million. Together with data for submission to the Food and Drug Administration, the development bills came to $6 million, bringing total R&D costs to $12 million. And this year the company will add another $1 million to its R&D budget.

In recent years, pharmaceuticals have generally ranked first among manufacturing industries in profit ratios (*chart*). But corporate and governmental records also reveal that no drug company's profits are fixed and inviolate; and they also show that pharmaceutical companies' earnings are often topped by companies in entirely different industries.

There's no telling how the producers of mental drugs will fare in the Kefauver hearing this week. Still, the fact shouldn't be overlooked that they will undoubtedly do well this year in helping provide treatment for the 15-20 million Americans needing their products for the alleviation of mental and emotional disorders.



Plastics Set Pace in CPI Growth Derby

Fast Growth in the '50s

Source: U. S. Dept. of Commerce.

	Value added by manufacture (million dollars) '50	'58(1)	'59(2)	10-year growth factor
1. Stone, clay, glass	**3,138**	**5,522**	**6,200**	**1.98**
2. Chemicals, allied products:	**7,237**	**12,623**	**14,200**	**1.96**
Plastics materials	386	874	1,150	2.98
Sulfuric acid, other industrial inorganics (except alkalis, chlorine)	557	1,418	1,560	2.80
Carbon black, salt, other miscellaneous chemicals	274	673	735	2.68
Toiletries, cosmetics, etc.	301	709	750	2.50
Compressed, liquefied gases	86	172	200	2.34
Synthetic rubber	109	199	250	2.27
Drugs and medicines	1,110(3)	2,107	2,380	2.14
Insecticides, fungicides, etc.	52	86	100	1.92
Industrial organics (except otherwise listed)	1,222	2,090	2,325	1.90
Alkalis and chlorine	185	298	350	1.89
Fertilizers	171	309	322	1.88
Soap and related products	682	1,123	1,200	1.76
Explosives	86	136	148	1.72
Paints and allied products	665	1,007	1,100	1.65
Printing inks	70	102	110	1.57
Synthetic fibers	717	836	1,000	1.40
Gum and wood chemicals	64(3)	73	75	1.19
Vegetable and animal oils	393	412	445	1.13
Total chemical, allied products	7,237	12,623	14,200	1.96
3. Pulp, paper, etc.	**3,438**	**5,855**	**6,400**	**1.86**
4. Primary nonferrous metals	**406**	**697**	**735**	**1.81**
5. Rubber products	**1,620**	**2,345**	**2,700**	**1.67**
6. Petroleum, coal products	**2,139**	**2,576**	**2,700**	**1.26**
Total CPI	**17,977**	**29,618**	**32,935**	**1.83**
All manufacturing industries	**89,750**	**142,093**	**160,000**	**1.78**

(1) Preliminary report by U.S. Bureau of Census; (2) CW projection, based on monthly production figures; (3) estimated.

Some solid statistics showing the CPI's growth came out last week. Plastics scored the greatest growth among chemical process industries over the past decade. CPI as a whole however, burgeoned faster than most other manufacturing industries during this 1950-59 period. Significantly, production gains were substantially steeper than increases in profits.

Using monthly production figures to project '59 data from the preliminary report—issued last week—on the government's annual Census of Manufactures for '58, CHEMICAL WEEK computes that the decade just ended brought these developments:

• While U.S. population increased 17.2% and non-CPI companies were raising their average annual "value added by manufacture" by 76.4%, the process industries racked up an 83.3% growth.

• Among the major CPI categories, highest growth rates for the decade were in stone, clay and glass products and in chemicals and allied products.

In chemicals and allied products, the Census Bureau's preliminary report shows that from '50 to '58, value added increased by 74.5%, and the industry's total employment rose by 16.1%. There was a 5.9% rise in number of production and maintenance employees—up from 457,000 to 484,000—and a 41.5% hike in number of employees on weekly, monthly, and annual salaries—up from 183,000 to 259,000.

Man-hours worked by hourly paid employees inched up 3.1%—from 955 million to 985 million.

Total payroll costs mounted 77.9%, to nearly $4.2 billion (slightly more than 33% of value added). Average annual wage payments rose 52.2%, to $4,900; and average annual salary payments increased 46.1%, to $6,960. In comparison, corporate earnings were up 20.6%, and cash dividends paid to stockholders moved up 48.2%.

In production of synthetic resins and other plastics materials, there was a 126.3% gain in value added between '50 and '58. Number of hourly paid employees was up 60.7%, to 36,000; and number of salaried employees mounted 110%, to 16,000.

COMPANIES

Dow Chemical Co. and **Pacific Chemical and Fertilizer Co.** (Honolulu) have formed a new joint venture, Hawaiian Extruders Inc., to produce polyethylene film and film products. The new company has bought the assets of Wilson Products Co. Polyethylene film output in Hawaii has risen from 40 million lbs. in '51 to 220 million lbs. in '58.

•

Stepan Chemical Co. (Chicago) has expanded into the liquid fertilizer business with the acquisition of Ris-Van Inc. (Belmond, Iowa), in exchange for 21,800 shares of stock, valued at about $600,000.

•

Smith Kline & French (Philadelphia) has acquired Norden Laboratories (Lincoln, Neb.), producer of veterinary pharmaceuticals, in a 3½-for-1 stock exchange. Norden's value is "in excess of $5.5 million."

•

United Carbon Co. (Charleston, W. Va.) has made a "major realignment" and expansion of its domestic and international marketing operations, and has set up a marketing committee with offices in New York, Houston, and Akron.

•

Consolidated Paper Corp., large Canadian pulp and paper producer, has acquired the four multiwall bag plants of St. Regis Paper (Canada) for $37 million, including $1.6 million in cash and 785,000 new shares of Consolidated common stock. This gives St. Regis a 13% interest in Consolidated.

•

Courtaulds (Canada) Ltd., subsidiary of the British fiber giant and a major Canadian producer of viscose fibers, has formed Courtaulds Carpets Ltd. to make viscose carpets. Courtaulds entered the carpet business several years ago by developing a special-purpose solution-dyed viscose and having carpets produced by a contractor.

•

Revlon, Inc. (New York) has bought AsthmaNefrin Co. (Portland, Ore.), producer of bronchial medicines, and will operate it as part of its Thayer Laboratories.

EXPANSION

Refinery Products: Western Operations, Inc.—a branch of Standard Oil Co. of California—will double its original investment in the 32,000-bbls./day Hawaiian refinery going up near Honolulu. Included in the expansion: a 13,000-bbls./day fluid catalytic cracker and alkylation plant for manufacture of high-octane fuels; hydrogenation and isomerization units for specialized products and feedstocks; a carbon monoxide boiler; and sulfur recovery equipment. Crude still, treating plants and original plants are to be completed Oct. '60; additional equipment is expected onstream by mid-'62.

•

Alkyl Phenols: Monsanto Chemical (St. Louis) has begun construction of facilities for manufacture of alkyl phenols at its Kearny, N.J., plant. Capacity and costs were not disclosed. Most of the production will go for Monsanto's alkyl phenol-based ethylene oxide condensates. Completion date: Sept. '60.

•

Metallurgical Lime: Minerals & Chemicals Corp. (Menlo Park, N.J.) and Neville Lime Co. (Cleveland) have formed Cuyahoga Lime Co. Cuyahoga's plant will be built at Cleveland to make metallurgical-grade limestone for that steel area. Spurring demand: new oxygenation steelmaking process facilities being installed in the region.

FOREIGN

Paints/England: Courtaulds Ltd. is continuing its diversification into the paint industry with the proposed acquisition of Pinchin, Johnson & Associates, Ltd., largest paint manufacturing group in the United Kingdom. Its net assets are $28.6 million; profits last year hit $6 million. Courtaulds entered the paint field last year by picking up Cellon, a smaller firm, and last month signed an agreement to use Glidden know-how on a royalty basis.

•

Investment/India: Japanese chemical producers interested in investing in India may be encouraged by a new tax-sparing agreement signed by Japan and India. Like the similar agreement recently signed by India and the U.S., it eliminates Japanese levies on income exempted from taxation under India's investment incentives law.

•

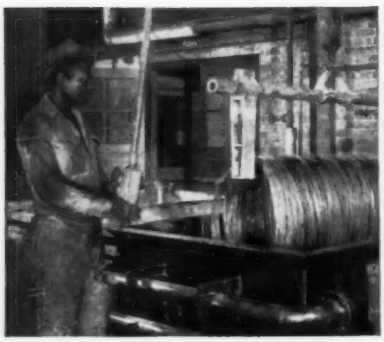
Fertilizer/India: India will import $2 million in urea and other nitrogenous fertilizers from France this year, with U.S. aid. Payments will be made into the U.S. rupee account with India, and will be deducted from the U.S. franc account, under PL 480. India also plans to buy 100,000 tons of ammonium sulfate and 120,000 tons of urea and other fertilizers from West Germany and other European countries.

•

Equipment/Soviet Bloc: Latest batch of equipment deals between western European producers and the Communist bloc: Russia is buying a 24,000-tons/year polyethylene plant from Berg- und Huttenbetriebe (West Germany), a $1.8-million polystyrene plant from P. G. Engineering (England), and a 70,000-tons/year synthetic-rubber finishing plant from John Dalglish & Sons Ltd. (Scotland). Hungary, meanwhile, has purchased two 10,000-tons/year caustic soda plants from Krebs Cie. (France).

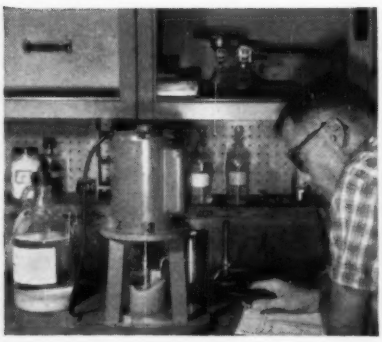
PUMPAGE

Goulds news about pumps for process industries



In and out of a pickle

One of the many steps in the manufacture of steel wire is the dunking of coils in a pickling solution. To clean the heavy wire, you need plenty of water *plus* a high-pressure spray—both adequately supplied at this plant by a Goulds Fig. 3330 pump. This four-inch, four-stage centrifugal, driven by a 50-hp motor, delivers approximately 200 gpm at a discharge pressure of 240 pounds, creating the pressure and capacity necessary to do the job effectively. Another Goulds pump supplies pressure for the spraying of coils of fine wire. Both pumps are operated at five-minute intervals throughout the day and have required just routine maintenance of the packing box since installation approximately five years ago.

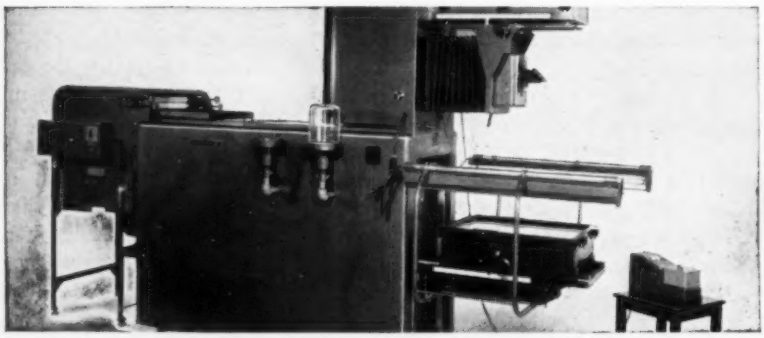


New test lab for you

How do you select the materials of construction for your chemical pump? Published materials-recommendation charts are generally based on static corrosion tests. These data, however, may be completely erroneous when applied to a centrifugal pump. The combinations of erosion from solids plus differential velocities and impingement with corrosion make selection difficult. Unless actual field experience is available, any recommendation involves guesswork. To minimize guesswork Goulds now offers the best substitute for field experience. A new Customers Products Test Lab is designed to provide answers on how a liquid will react inside your pump. Abrasion testers simulate actual conditions inside a pump. Results from these tests provide information to help solve corrosion problems.

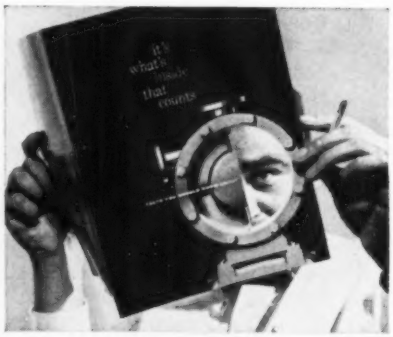
Emergency at Niagara Falls

Diversion conduits now under construction at Niagara Falls will take water from the Niagara River and convey it through and under the city to a new hydroelectric plant at Lewiston. During construction of the conduit's 300-foot descent through solid rock to Lewiston, ground water pockets were encountered that had to be drained before construction could continue. An emergency call came to Goulds: Could we help? Quick delivery of Goulds 3135 centrifugals saved the contractor many thousands of dollars in lost time; six more pumps were added as the need for greater capacity developed. Selected for ease of maintenance and ability to handle rugged solids, these process pumps solved this unusual application problem. Get the details by writing.



Small pump solves big problem for Photostat Corp.

Builders of original equipment are finding that a Goulds process pump fits their requirements ideally. Dependability is imperative, for if the pump fails, the entire unit is out of service. Take, for instance, the case of Photostat Corporation. Inside a Photostat Copying Machine, the complete photographic process occurs automatically: the making of a negative plus developing, washing and drying operations. Because the developer solution must be circulated constantly, Photostat needed a compact pump that could reliably provide continuous service. We supplied the pump —Goulds Fig. 3604, a ¾" centrifugal with "big pump" stamina. Today hundreds of these pumps are in operation on new equipment and as replacements for older equipment. Have equipment that requires constant circulation of liquids? Write for Bulletin 725.6.



Inside the Goulds-Pfaudler pump

Inside this unusual booklet are facts you should know about a revolutionary answer to your corrosive-pumping problems. It's all about the Goulds-Pfaudler glassed pump, as the only pump of its kind. This booklet gives the answers to question after question, starting with "What is glassed metal?" and ending with "Is the glassed pump operated like any centrifugal pump?" Send for your free copy today. Goulds Pumps, Inc., Dept. CW-1, Seneca Falls, N. Y.

GOULDS GP PUMPS

Washington
Newsletter

CHEMICAL WEEK
January 23, 1960

The $4.2-billion surplus in Eisenhower's budget doesn't look so good when you examine the books in detail. Budget officials made some big assumptions to arrive at the spending figure of $79.8 billion and the projected revenue of $84 billion.

The President has budgeted for some cuts that Congress certainly won't go along with. For instance: he wants to cut grants for sewage treatment works from $50 million to $20 million, whereas a bill to double the $50 million is already through both houses; he wants to pare school aid to federally impacted areas, which Congress rejected last session; Congress will certainly not go along with cuts of $60 million for hospital construction. Pressure will also be strong to increase military spending.

Eisenhower's revenue estimates depend on Congress increasing postal rates, gasoline and aviation fuel taxes, and extending wartime phone and transportation taxes, totaling over a billion dollars. Congress has already said no to all of these.

Nevertheless, Democrats may try to make cuts elsewhere—particularly in foreign aid—to keep within the President's spending figures. Last session they shied away from the tag of "spenders."

Here's how the budget looks on items of special interest to CPI:

Food and drug enforcement: An 18% increase, from $15 million to $18 million, is asked for FDA. Most of it will go for increased radiological activities. For the current year, $332,000 more will be sought in a supplement request for checking food samples for radiation contamination.

Radiological health: A total increase of $5 million for research, including FDA's increase, will be sought.

Water pollution: A one-third increase, $4.1 million to $6.3 million, will be requested for research. Construction grants for sewage treatment works would be cut, however, from $45 million to $20 million. Actually, Congress is set to double the present level; the President will veto it; and spending will continue at the $45-million level.

Air pollution: A slight increase, from $4.3 million to $4.9 million, is budgeted for studies of auto exhaust and to expand the air sampling network.

Total research and development: An increase, from $7.9 billion to 8.3 billion, is scheduled, 70% of it in the Defense Dept. and 13%

in the atomic energy program. The portion for basic research will rise from $500 million to $600 million—$34 million of it for the National Science Foundation. The space budget for R&D will nearly double, from $325 million to $600 million.

Medical research: Last year Congress boosted the National Institutes of Health budget from a proposed $294 million to $400 million. The President protested that he could not spend that much without pulling doctors and researchers away from other vital services. Nevertheless, all but $5.8 million will be spent this year, the unspent funds largely in cancer research.

For next year, the Administration is willing to continue the $400-million level. Approximately $281 million of that will be for medical research, the rest for training and administration. The President will also ask Congress to remove the 15% limitation on administrative costs in grants to hospitals and universities for research. The colleges say it is unrealistic.

Agricultural research: This will increase from $129 million to $138 million, including a small boost in research on pesticide residues and basic research.

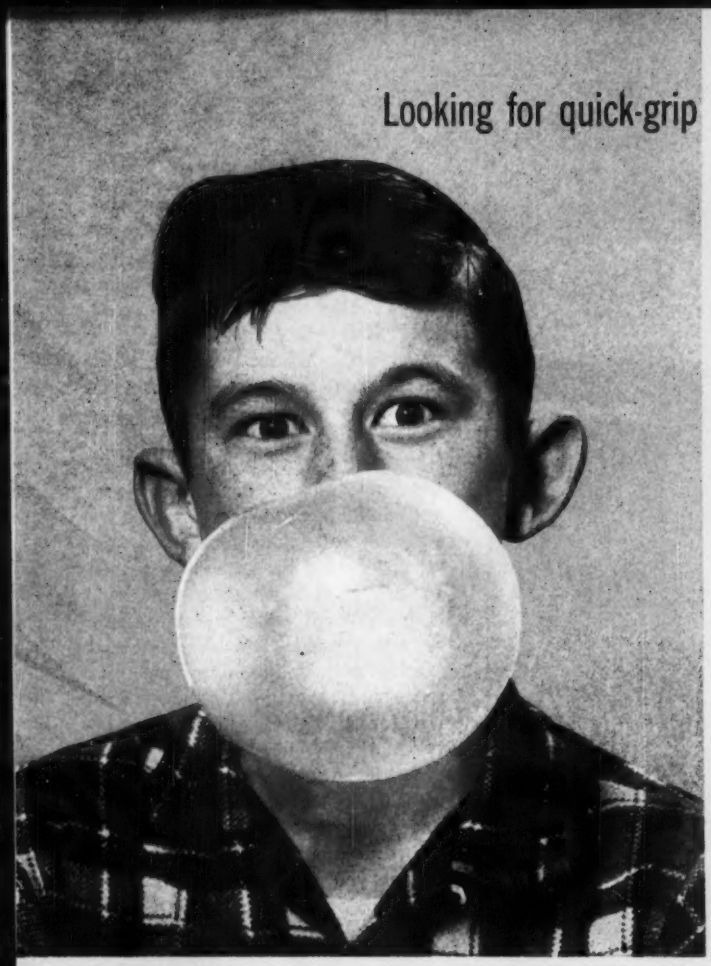
Saline-water conversion: A slight increase, from $1.8 million to $2 million is budgeted for salt-water conversion. During the current fiscal year, engineering and design will be finished on three demonstration plants and construction started on one. Next year, designs for the other two will be finished, and construction will start on a brackish-water plant and a second sea-water plant. The first two demonstration plants will go into operation in '61.

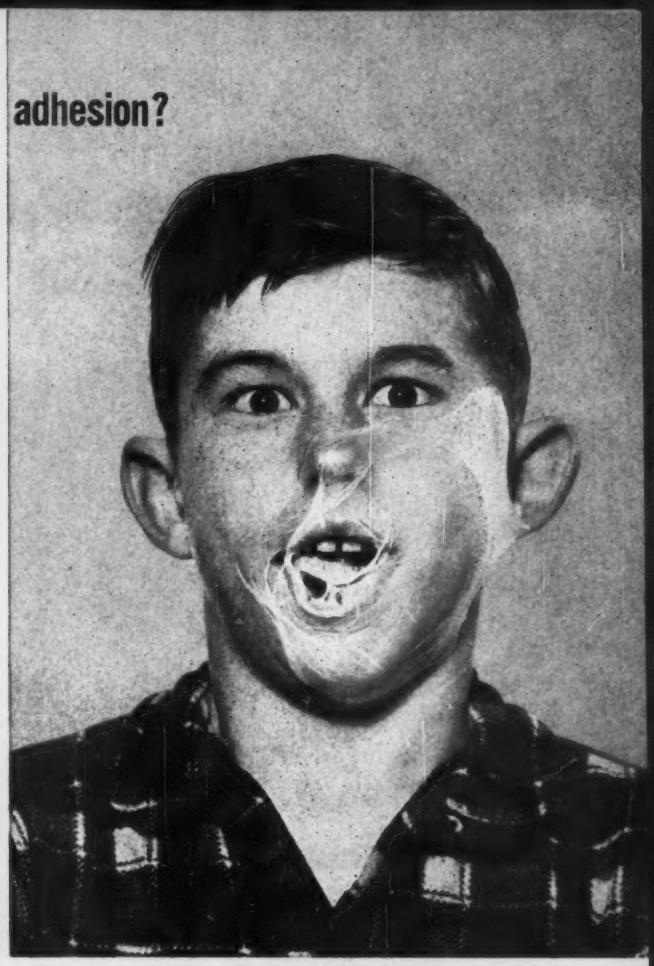
Antitrust: FTC request is for $7,600,000 for antitrust efforts, an increase of $760,000 over '60. Half the hike is for policing deceptive practices. The Justice Dept.'s antitrust division request is $4,760,000, an increase of $260,000 over '60.

The President again requested legislation in the antitrust field: a law putting bank mergers accomplished by acquisition of assets under the same regulation as those involving stock acquisition; a premerger notification law; authority for the Attorney General to subpoena company records for use in antitrust investigations; and authority for FTC to seek a preliminary injunction against a merger it believes will violate the law.

If this amendment is passed, then Anderson would instruct revenue agents to be more lenient in giving faster write-offs to those companies that make a case that their equipment actually depreciates faster than IRS is now allowing.

Democratic congressmen are inclined to go along. The question is whether the legislation could get through in the crush this session.





Versamid® polyamide resins give greater **adhesion** to coatings, adhesives and flexographic inks.

You get quick-grip adhesion with thermoplastic Versamid polyamide resins (900 series). These flexible polymers have an unusual combination of physical properties and provide a wide range of softening points and solubilities. They are compatible with many resins and plasticizers—and adhere tenaciously to many materials including wood, metals, papers, ceramics and plastics.

Epoxy-reactive Versamid polyamide resins (100 series) when used in combination with epoxy resins also provide tenacious adhesion to many surfaces.

All Versamids offer high resistance to mechanical and thermal shock and aging. They have excellent ability to withstand moisture, grease, oils, alkalies and abrasion. And Versamid resins are safe and easy to formulate—they are non-toxic and may be combined with epoxy resins in non-critical proportions.

For more complete information on Versamid polyamide resins write General Mills, Chemical Division, Dept. CE 15, Kankakee, Illinois.

Choose the Versamid polyamide resin that best suits your particular needs:

Thermoplastic Solid Series

VERSAMID	900	930	940	950
Color-Gardner (Solid)	12 Max.	12 Max.	12 Max.	12 Max.
Softening Point ASTM E-28 51T Modified	180-190	105-115	105-115	90-100
Viscosity**—Poises—150° C	—	30-45	15-30	7-15
Viscosity—Poises—200° C	3-4	—	—	—

**Brookfield Viscometer

Epoxy-Reactive Resins

VERSAMID	100	115	125	140
Amine Value*	89-93	210-220	290-320	350-400
Color-Gardner	12 Max.	12 Max.	12 Max.	12 Max.
Viscosity**—Poises—40° C	—	500-750	80-120	—
Viscosity—Poises—75° C	—	31-38	7-9	2-6
Viscosity—Poises—150° C	7-12	—	—	—

*The amine value is the milligrams of KOH equivalent to one gram of resin.

Solutions of Reactive Resins

VERSAMID	400	401	410
Color-Gardner	12 Max.	12 Max.	12 Max.
% Solids	59-61	59-61	69-71
Viscosity @ 40° C	5-13	10-19	3-9

Sales Offices:
New York, Boston, Philadelphia, Cleveland, Charlotte, Kankakee, Houston, Los Angeles, San Francisco.

CREATIVE CHEMISTRY FROM GENERAL MILLS SERVES INDUSTRY WORLD WIDE

CHEMICAL DIVISION

KANKAKEE, ILLINOIS

Versamid® Polyamide Resins • Genamid® Epoxy Curing Agents • GenEpoxy Epoxy Resins • Fatty Nitrogen Chemicals • Deriphat® Amphoteric Surfactants • Sterols

General Mills

'Three-dimensional' space suit fabric is eyed by inventor Foster.

Lessons

At his comfortable Maplewood, N. J., home this week, recently retired Boutwell Foster gave CHEMICAL WEEK his formula for success in industrial research. His techniques yielded him 42 patents (eight more are pending) and according to his former employer, United States Rubber, have created hundreds of jobs and millions of dollars in sales.

Small, soft-spoken and highly energetic Foster has been responsible for scores of new fabrics, involving both synthetic and natural fibers. Among them: "three-dimensional" fabrics, with end-uses ranging from space suits to artificial lungs; material for fire-fighting suits; and tear-resistant, inflatable "air houses."

Where to Think: In his 42 years with U.S. Rubber, Foster worked under a variety of conditions. He started in an old building in Newark, N.J., where "you had to shove your way through dogs and cats." He finished official duties at the company's new, $7-million research center, where he mentored 14 staffers as textile research manager. He will continue working at his home in a little shop, where impromptu brainchildren can be reared.

Foster doubts whether the quality of any new idea is dependent on the environment in which it is conceived: "In that little out-of-the-way place in Newark, we created some great new things. We were in on the start of new products, and we had a big share in expanding the company's tire-cord business into one of the most diversified textile operations in the country.

"The difference between that early laboratory and our new research center is fantastic. Today's facilities and atmosphere are superb, and I am the first to admit that a beautiful environment can attract top scientific manpower. Yet, environment isn't all that is needed for creativity. An idea is born anywhere a man puts his mind to it."

Know Your Field: One reason for Foster's success in turning up profitable ideas is his thorough knowledge of textile technology, coupled with sensitivity to public buying preferences.

from a Prolific Lifetime in the Lab

He says he fortunately was able to choose his own assignments without management instruction. Usually, he would conceive a basic product or idea, then work out its applications. For example, his curiosity about the shrinkability of American Viscose's Vinyon HH led to experiments utilizing this property to make "three-dimensional" fabric. Having developed the fabric, he proceeded to work out uses for it.

Follow the Leader: No "one-man show," Foster holds that a group of specially skilled researchers functions better than an individual in bringing ideas to commercial culmination. But there is an optimum size for this group, depending in part on the capacity of its leader. He believes that smaller groups are likely to be more efficient, get results quicker. This faith in the smaller research unit is supported by the action of some of the major research foundations, such as those set up by Ford and Rockefeller. They have made grants in lots of $100,000 or more. Now, they've found that smaller grants, $25,000 or so, widely dispersed, are yielding highly gratifying results.

The leader must be able to impart his own enthusiasm and be available to staffers for consultation, Foster says. "I often put the lights on in the lab in the morning, was ready, with sleeves rolled up, when the staff arrived." This demonstration of eagerness is important, he believes, because "no matter how educated your researchers are, they follow the leader, emulating both his habits and his attitudes."

Picking the Help: "I dislike giving advice," says Foster, "but if any young man contemplating a research career were to ask me, I'd probably tell him research takes plenty of hard work, and you take out only in direct proportion to what you put in. When you coast along, you're only cheating yourself—and I'm not the first person to discover that."

In looking a man over for possible employment, you can tell a lot about his potential by his actions, ease and enthusiasm, Foster notes: "Look for keenness of intellect, ability to adapt,

'An idea is born anywhere a man puts his mind to it.'

'I don't think the researcher's object should be to get a patent.'

rather than impressive evidence of education." The Ph.D's knowledge has been known to outstrip his intelligence, Foster suggests, "so don't bar research jobs to holders of lesser academic degrees, provided they show promise of being expert craftsmen in applying the knowledge they possess." Foster adds that he prefers Ph.D.'s—if they have the other desirable qualities.

Foster himself holds a B.S. in textile engineering (Lowell Textile Institute, '17), started his career as a $17/week lab assistant. His patent output started to snowball in the '30s, more than a decade after hiring on with U.S. Rubber.

Gauge of Excellence: Patents, he feels, are a good criterion of research productivity: "After all, they're evidence of a contribution made despite keen competition."

Publications, on the other hand, are less likely to contain commercially useful information, he feels, thus making it more difficult to assess the researcher's accomplishments. However, he cautions, "I don't think the researcher's objective should be to get a patent for his work; the patent should be a by-product of the work. If the fundamental work isn't done first, the project will probably flounder before patentable applications turn up. In other words, the main goal shouldn't be invention."

Foster's continuing work on projects at his home is only one indication that he is a long way from being through with research, despite his retirement. He was recently appointed a research associate in the surgical research laboratory of the Bronx Veterans Administration Hospital and the Albert Einstein College of Medicine in New York, in recognition of his contributions to surgical textiles.

Unfamiliar fields do not stop Foster. "Nothing takes the place of your own imagination," he suggests, "I'd just as well not see how a thing has already been done in working out a new way to do it."

'No matter how educated researchers may be, they will follow the leader.'

Hybrid Rocket

This week, Thiokol Chemical's Reaction Motors Division (Denville, N.J.) allowed a partial peek at its work on a hybrid rocket engine that uses both liquid oxidizer and solid fuel. The engine can be shut down and restarted, may be throttled over a full-thrust range, which, says Thiokol, is "appreciably" higher than obtainable with strictly solid fuels. The project was financed in part by a small Air Force contract.

Thiokol isn't saying much about the chemical identity of the propellent components and how they are handled. Best guess: the solid portion contains boron or aluminum; the liquid is nitric acid. In describing the solid as "fuel-rich," Thiokol doesn't deny the possibility that it contains some oxidizer. In any event, it is the liquid oxidizer that is throttled by limiting the extent to which it enters into hypergolic (self-igniting) combination with the fuel.

Like Aerojet-General Corp., also working on a liquid-solid fuel engine, Thiokol is seeking to capitalize on increasing military interest in hybrid engines. Reason: the specific impulse advantage of bipropellent systems over solid-propellent formulas is often offset by the low bulk density of the liquids. By using a solid hydrocarbon fuel instead of the liquid (kerosene type) RP-1, for example, there is a bulk density gain without a loss in specific impulse.

Thiokol also believes its hybrid engine, still experimental, has a better chance of reaching specific impulse values in excess of 300-lb.-force-seconds per pound of mass than any other noncryogenic system. Its fuel system is storable, packageable, and involves no major geometrical change from all-solid propellents.

EXPANSION

• Monsanto is purchasing about 500 acres of farmland in Missouri's St. Charles County as the future location of an agricultural chemicals research farm. The company now operates a 270-acre experimental farm at Hazelwood, Mo., also raises broilers and steers in leased facilities at Affton and Castlewood, Mo.

• Hazel-Atlas Glass Division of Continental Can Co. (New York) plans to build a $1.5-million research and development laboratory at Plainfield, Ill., for studies on glass compositions, melting, new methods of forming and treating glass, and new glass containers.

• Sonoco Products Co. will build a $200,000 research center for paper and paper products at Hartsville, S.C. The 10,000-sq.ft. building will include an area for small pilot-plant operations, a constant-temperature and -humidity room and a wet room for pulp and paper testing and development.

• Standard Oil Co. of Indiana consolidated all research on petroleum products and processes in a single R&D department on Jan. 1. Concentrating its research at the company's Whiting, Ind., laboratories, the new department will also serve Standard's affiliates, American Oil Co. and Utah Oil Refining Co.

• Atomics International, a division of North American Aviation, now has in operation one of the largest privately owned facilities in the world for remote examination of radioactive materials. It's located in the Santa Susana Mountains, near Los Angeles. The heart of the installation is an 18,000-sq.ft. hot cell building that's used for development of fuel elements and for testing irradiated materials.

• Campbell Works of Youngstown Sheet & Tube Co. (Youngstown, O.) has completed a miniature coke oven for study of carbonization under closely controlled conditions. Maximum coal charge is about 750 lbs.

• Axel Plastic Research Laboratories has recently moved its office and laboratories to a new location: 1070-72 Manhattan Ave., Brooklyn 22, N.Y.

• A new corporation, Memorial Sloan-Kettering Cancer Center, is being planned to coordinate activities of the Sloan-Kettering Institute for Cancer Research and the Memorial

Acetaldehyde Ammonia
Acetophenone
Acetyl Chloride
Adipoyl Chloride
Anisic Aldehyde
Anisyl Acetone
Anisyl Alcohol Tech.
Anisyl Chloride
Anisyl Cyanide
Azelaoyl Chloride
Benzalacetophenone
Benzhydrol
Benzhydrylamine
Benzhydryl Chloride
Benzophenone Tech.
Benzyl Alcohol Tech.
Benzyl Cyanide
Butyroyl Chloride
n-Caproic Acid
Caproyl Chloride
Capryloyl Chloride
p-Chlorbenzhydrol
p-Chlorbenzhydryl Chloride
p-Chlorbenzophenone
p-Chlorbenzyl Cyanide
Cinnamoyl Chloride
Dibenzyl Ether
Dicyclohexyl Carbinol
Dicyclohexyl Ketone

INTERMEDIATES

p,p'-Dimethoxybenzophenone
Diphenyl Acetone (unsym)
Diphenyl Methane
Ethyl Formate Tech.
Ethyl Phenylacetate
beta Ionone
Isobutyroyl Chloride
Isovaleric Acid
Isovaleroyl Chloride
Lauroyl Chloride
p-Methoxy Phenylacetic Acid
Methyl Heptenone
Methyl Phenylacetate
Myristoyl Chloride
Oleoyl Chloride
Palmitoyl Chloride
Pelargonyl Chloride
Phenylacetic Acid
Phenylacetone
Phenylacetyl Chloride
Phenyl Propyl Alcohol
Phenyl Propyl Chloride
Potassium Phenylacetate
Propionyl Chloride
Propiophenone
Sebacoyl Chloride
Sodium Phenylacetate
Stearoyl Chloride
And
Other Intermediates

Send *for new booklet which describes our operation*

THE TRUBEK LABORATORIES

East Rutherford, New Jersey

A Message to Executives
Seeking a New Plant Site

Check these 3 Important
Plant Location Advantages in

PENNSYLVANIA

**100% financing
for your new plant**

Complete financing on lease-purchase plan—low interest rate—deferred amortization. Plant "shells" now being readied for completion. Inspection welcomed.

Improved "tax climate"

No capital stock and franchise taxes—no machinery and equipment taxes—no stock transfer tax—no state personal income tax—reduced manufacturer's sales tax.

Plant location services

Staff specialists available to serve industry, engineering firms, management consultants, industrial realtors and others with fully detailed plant location data.

For free copy of pamphlets on these Pennsylvania Plant Location Advantages, write or call:

PENNSYLVANIA DEPARTMENT OF COMMERCE
South Office Building
657 State Street, Harrisburg, Pa.
Phone: CEdar 4-2912

RESEARCH

Center for Cancer and Allied Diseases (all at New York). When the new organization is established, the Memorial Center will resume its original name: Memorial Hospital for Cancer and Allied Diseases.

• Shulton, Inc. (New York), has set up two new laboratories for research in toiletries for both domestic and foreign markets.

• The Anaconda Co. has reorganized its research department into three major areas (each headed by an assistant director of metallurgical research): chemical, concentration and pyrometallurgical research.

• Associated Testing Laboratories, Inc., environmental-testing firm, will move into a new, 30,000-sq.ft., $500,000 building at Wayne, N.J., in March.

• Gagliardi Research Corp. is enlarging its facilities at East Greenwich, R.I., by constructing a laboratory building. It's scheduled to be completed by June, will be used for additional equipment and personnel for studies in textiles, paper, leather, wood, plastics and related fields.

PRODUCTS

New Inhibitors: Four new inhibitors are offered in development quantities by Eastman Chemical Products, Inc. (New York), division of Eastman Kodak. Hexamethyl-phosphoric triamide (HPT), resorcinol monobenzoate (RMB), and *p*-octylphenyl salicylate (OPS) are expected to find use as ultraviolet stabilizers for synthetic resins such as vinyls, polyesters and polyolefins. Trihydroxy butyrophenone (THBP) shows promise as an antioxidant for polyolefins and paraffins.

•

New Drug: A new nonnarcotic analgesic, phenyramidol, may be substituted for codeine and aspirin in *post partum* analgesia, according to Dr. Amos Wainer of the Castallo-Wainer Clinic for Women (Philadelphia). The compound, tradenamed Analexen, was developed by Irwin, Neisler Co. (Decatur, Ill.).

•

Reagent Sprays: New reagents in aerosol form for chromatography include ninhydrin in acetone and butanol, bromcresol green, and ferric chloride. The spray packaging is said to speed tests, reduce waste; units are available from Schuco Scientific Division of Schueler & Co. (75 Cliff St., New York 38, N.Y.).

•

Semiconductor Entry: Phosphorus with a purity of 99.9999% or higher is now available from the chemical division of The American Agricultural Chemical Co. (100 Church St., New York 7, N.Y.). It's intended for use in semiconductors for high-temperature electronic systems, electroluminescent coatings.

•

New Herbicide: Food Machinery and Chemical Corp.'s Niagara Chemical Division has a new herbicide (2,6-dichlorobenzonitrile) for combating wild oats and other weeds. It's most effective when applied as a preplanting or pre-emergent herbicide in quantities of 3-4 lbs./acre.

REPORTS

These reports are available from the Office of Technical Services, U.S. Dept. of Commerce, Washington 25, D.C.:

• Phosphorus- and aluminum-containing polymers, stable at 750-900 F, are reported in "Research on Elevated - Temperature - Resistant Inorganic Polymers: Structural Adhesives" (PB 131934, $1.50) and "Development of Inorganic Polymer Systems" (PB 131935, $1.75).

• "Basic Research in the Navy" (PB 151925, $7) is a two-volume Arthur D. Little report of its two-year study for the Navy. The report applies new methods in the measurement of basic research.

LITERATURE

• "Symposium on Basic Research" (available from American Assn. for the Advancement of Science, 1515 Massachusetts Ave., NW, Washington 5, D.C.; $3) is a newly published compilation of papers and discussions from the symposium held in May '59.

• "Index Chemicus" is a new monthly index to the 50,000 new chemicals reported each year. It will be published by Eugene Garfield Associates (1122 Spring Garden St., Philadelphia 23).

• Research Specialties Co. (Richmond, Calif.) has published a catalog of its offerings of carbon-14 labeled compounds.

Progress Report...

—UCAR butylene oxide 12
—Alkylene amines
—Hexylene glycol

New . . . UCAR butylene oxide 12

CARBIDE has a new member of the oxide family for use in polymerization and condensation reactions — UCAR butylene oxide 12.

UCAR butylene oxide 12 is high purity 1,2-butylene oxide . . .

1,2-butylene oxide

With many materials, UCAR butylene oxide 12 reacts much more rapidly than do blends of butylene oxide isomers.

Used with ethylene and propylene oxides . . . butylene oxide increases the oil solubility of detergents, wetting agents, lube oil additives, and demulsifiers.

As a direct replacement for propylene oxide . . . butylene oxide ties up acid halides formed in the preparation of halogenated solvents and resins. The low volatility of butylene oxide makes it easier to handle.

Since UCAR butylene oxide 12 can be used directly in both polymerization and condensation reactions you may uncover many entirely new products based upon these molecules.

Remember, UCAR butylene oxide 12 can be purchased in bulk combination with other chemicals from CARBIDE. Bulk purchasing in mixed lots means savings in cost, and lower inventories, too.

A new technical bulletin is now available. It contains information on the physical properties, suggested applications, and physiological properties of UCAR butylene oxide 12. For your copy check the box "UCAR butylene oxide 12" on the coupon.

To improve agricultural chemicals . . .

Manufacturers of agricultural chemicals find it profitable to consider CARBIDE's alkylene amines when devising new formulas or improving current products. For instance . . .

Iron is necessary for the formation of chlorophyll. So, it affects the growth of all citrus fruits, flowering shrubs, lawn grasses, and shade trees. If these plants don't get enough iron they quickly become pale green or yellow. This condition, known as iron starvation or iron chlorosis, may slow the growth of plants and even kill them.

Iron chelates, made from the tetraacetic acid derivative of CARBIDE's ethylene diamine, offer a simple but effective means of correcting iron starvation in plants. The chelates contain iron in water-soluble form. Thus, it is readily available to plants in a form they can use.

Iron chelates, made with CARBIDE's amines, can be sprayed directly on the foliage or applied to the soil feeding the roots.

Further information on the many uses of CARBIDE's ethylene diamine and other alkylene amines is contained in a new booklet. For your copy, check the coupon.

Blending liquid systems or improving latex paints?

Most systems comprised of oils and liquids that are ordinarily difficult to blend can be effectively coupled by the addition of hexylene glycol (2-methyl pentanediol-2,4). Industrial cutting oils, soluble oils, liquid detergents, dry-cleaning soaps, and emulsions are representative of mixtures that become miscible with the aid of hexylene glycol.

The inclusion of hexylene glycol in alkyd-modified styrene-butadiene latex paint formulas permits a higher pigment volume concentration and improved leveling with brush or roller. The paint film gains extra scrub resistance, better hiding properties, and less yellowing at a lower cost per pound of solids.

Lacquer-type inks, and both specialty and standard inks based on resins insoluble in ethylene glycol or diethylene glycol, can be formulated with hexylene glycol. Its evaporation rate is also of benefit in fast-drying and steam-set inks.

Hexylene glycol helps to reduce particle size and to prevent agglomeration during grinding operations involving silicious materials or Portland cement. A more uniform aggregate is obtained, while valuable time is saved.

Other important uses of hexylene glycol are in the synthesis of sulfolanes, esters and diesters. A 62-page booklet, "Glycols," contains properties and other facts about hexylene glycol, together with profitable information about CARBIDE's other glycols. Check the coupon for a copy.

Tear out this coupon. Check the boxes on which you'd like more information, and mail to Dept. HW, Union Carbide Chemicals Company, 30 East 42nd Street, New York 17, N. Y.

☐ Ucar butylene oxide 12. ☐ Glycols booklet.
☐ Alkyl and Alkylene Amines booklet.

Name_____

Company_____

Position_____

Street_____

City_____ Zone_____

State_____

And remember, there is a CARBIDE sales office near you where you can obtain the services of a CARBIDE Technical Representative. His wide industry experience is backed both by extensive chemical training and by Technical Specialists.

UCAR and UNION CARBIDE are registered trade marks of Union Carbide Corporation.

UNION CARBIDE CHEMICALS COMPANY
DIVISION OF
UNION CARBIDE
CORPORATION

a new source for...
propylene oxide • propylene glycol
polypropylene glycols...

Olin Mathieson is now offering propylene products from extensive new facilities being completed at the Doe Run plant in Kentucky. Propylene Oxide—starting point for the manufacture of propylene glycol and other derivatives. Propylene Glycol—with proved applications in the manufacture of cellophane, for keeping tobacco moist, in food, beverages, drugs, polyester resins, cosmetics and plasticizers. Polypropylene Glycols—used to make foams for crash pads, for garments, refrigeration insulation and to strengthen construction between sheets of aluminum in air frames. For complete information on the new Olin Mathieson propylene polyols—or helpful technical assistance, write to Olin Mathieson.

OLIN MATHIESON
CHEMICALS DIVISION, NEW YORK 22, N. Y.

CHEMICALS

7284

ETHYLENE OXIDE • ETHYLENE GLYCOLS • POLYETHYLENE GLYCOLS • PROPYLENE OXIDE • PROPYLENE GLYCOL
POLYPROPYLENE GLYCOLS • ETHANOLAMINES • GLYCOL ETHERS • SURFACTANTS • ETHYLENE DICHLORIDE

Atomic Activity Within the States

STATE	Uranium Mining	Uranium Milling	Uranium Refining	Uranium Enrichment	Uranium Fuel Preparation	Uranium Fuel Manufacturing	Uranium Fuel Reprocessing	Nuclear Reactor Manufacturing*	Reactor Development Centers**	Component and Equipment Supply†	Atomic Power Plants	Small Power Plants	Nuclear Ship Construction	Nuclear Test Reactors	Radioactive By-product Utilization‡	Nonreactive Research, Development	Thermonuclear Fusion Research	Plutonium Production
Alabama												✓						
Arizona	✓	✓																
California						✓		✓		✓	✓	✓	✓	✓	✓	✓	✓	
Colorado	✓	✓										✓						
Connecticut						✓		✓	✓				✓					
Florida											✓							
Georgia																		
Hawaii																		
Idaho							✓		✓			✓		✓				
Illinois			✓					✓	✓	✓	✓	✓			✓	✓		
Kentucky				✓														
Maine													✓					
Maryland						✓		✓										
Massachusetts						✓				✓	✓		✓					
Michigan								✓			✓							
Missouri			✓		✓													
Minnesota												✓						
Mississippi													✓					
Nebraska											✓							
New Jersey													✓				✓	
New Mexico	✓	✓															✓	
New York						✓		✓	✓	✓	✓				✓	✓	✓	
North Dakota														✓				
Ohio			✓	✓					✓	✓		✓		✓				
Oregon	✓	✓						✓										
Pennsylvania					✓	✓		✓	✓	✓	✓	✓			✓			
South Carolina							✓					✓						✓
South Dakota	✓	✓									✓							
Tennessee				✓	✓		✓		✓	✓		✓				✓	✓	
Texas														✓	✓			
Utah																		
Virginia						✓		✓				✓	✓					
Washington	✓	✓				✓												✓
Wisconsin																		
Wyoming	✓	✓																

*Firm contracts only — not development; **major federally owned centers; †source: Bureau of Census; ‡industrial uses, top five.

States Launch Drive for Atomic Industry

Even though most states now have some kind of atomic activity within their borders, only a handful are aggressively trying to attract more. Two plans that may serve as models for either state or regional atomic development programs, however, have reached advanced stage this week:

(1) In New York state, legislators are looking at basic amendments to the state's atomic code.

(2) In the South, convening legislatures will be asked to approve the nation's first regional compact—among 16 states—designed to promote atomic development.

New York Steps: New York legislators have been requested by Gov. Nelson Rockefeller to amend the state's basic atomic law so that the state can find and secure sites for

storage of radioactive by-products; promote building of an atomic test reactor; secure port facilities for the handling and servicing of atomic vessels.

The law would provide for appropriation of $147,000 toward condemnation or purchase expenses of land not already owned by the state.

It would also allow the state to enter into cooperative agreements with the federal government, enabling the former to take jurisdiction over activities the federal government is willing to relinquish. The legislation also provides for the institution of a training and personnel program to deal with accidents, fires, or disasters and for the licensing and control of any sources of ionizing radiation.

Enactment of these proposals—which seems likely in a legislature favorably disposed toward Governor Rockefeller—would put the state's Office of Atomic Development in an excellent bargaining position to seek new industry.

New York already has a broad atomic law under which it has made some important studies of its needs and potentials and has taken at least one concrete step. This was the signing of a contract in December under which the state agreed to contribute up to $1 million on a matching basis with the University of Buffalo to establish a nuclear research center on U. of B.'s campus. Construction of the center is already under way.

Southern States: In the South, nine convening legislatures have the opportunity to approve a 16-state* compact that would set up a regional office to "encourage the development and use of nuclear energy, facilities, installations, and products as part of a balanced economy."

Although governors of all the states have approved the compact, hammered out over more than a year of conferences (*CW, Dec. 27, '58, p. 56*) and endorsed in Oct. '59, none has officially entered it on his legislative docket for '60. However, it's expected that the agreement will be put before the lawmakers of at least four states—Georgia, South Carolina, Mississippi, and Kentucky—during current sessions. Five other states — Delaware, Louisiana, Maryland, Virginia and West Virginia—have current sessions in which backers of the compact are hoping it may be introduced for ratification.

Confirmation by at least seven states is needed for the compact to take effect; there are divided opinions on whether Congressional approval is needed under Article I of the U.S. Constitution. Eventually this will be sought.

The Southern states' compact would set up a coordinating agency designed to assist the various states in their own development projects, to collect data and information, and to set up training and educational projects. These states have had considerable experience in regional cooperation through the Southern Regional Education Board, which has been operating for several years and has been a model for other regional boards. Regulatory powers for the agency have been eliminated from the compact.

There are few states that do not have some sort of a program connected with a research reactor. At latest count, 30 states and the District of Columbia have such a program. But only seven have adopted comprehensive regulatory codes to protect against radiation hazards, and only 17 have adopted legislation providing for the coordination of state atomic energy activities, as well as stimulation of atomic development.

Newest expected development will be in South Carolina, where a special committee on atomic development will report to the legislature this month with specific proposals for attracting industry.

Outlook: In spite of pessimism over atomic generation of electricity, fuelmakers report good business supplying atomic materials, while industrial, medical and research utilization of radioisotopes is rapidly growing.

In the light of steadily growing business in atomics generally and the atmosphere of public regulation surrounding it, it's a pretty sure bet that other states may soon be forced to begin promoting atomic development.

Historically, location of atomic facilities has been haphazard, based on markets, research facilities, existing industry, raw materials and defense needs. Now that patterns of development are better defined, states have the opportunity to attract atomic industry.

* The states: Alabama, Arkansas, Delaware, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, West Virginia.

California Smog

California is stepping up its drive against air pollution. Gov. Edmund Brown last week called for a special session of the legislature in March to deal with air-pollution problems: Brown's program will likely call for exhaust-treatment devices for autos. And, on a municipal level, some California groups are calling for closer industrial exhaust control.

The air-pollution issue is being added to the state's docket because, Brown says, "We cannot afford to lose a year in the fight to clean up the air." State lawmakers will be in session in March, considering budgets—the sole "even year" duty—and because they've met to consider fiscal matters only, the governor had to call the extraordinary session.

Recommendations: The governor, expected to recommend legislation requiring antismog devices on all motor vehicles in California, proposed such units in a television speech Jan. 7. All vehicles will likely have to have these devices by '64.

The state has already shown interest in a new device developed by Thompson Ramo Wooldridge Inc. (Los Angeles) in cooperation with Chrysler Corp. This unit is a manifold with an air pump—its only moving part—to force oxygen into the exhaust gases, which are burned at about 1,500 degrees. The device would replace the usual muffler.

Smith Griswold, director of the Air Pollution Control District in Los Angeles, said that, for a V-8 engine, requiring two devices, the cost would be about $125; for a six-cylinder car needing only one, the cost would be less than $100.

Any exhaust-treating device will likely have to meet the standards for discharge of motor vehicle pollutants set up by the state's health department. Health officers attacked the problem in '59, after Brown pushed through the necessary legislation.

Recommendations for the standards have now been proposed, and—if adopted, will require an 80% reduction in emission of hydrocarbons from motor vehicle exhausts and a 60% cut in carbon monoxide. No motor vehicles in California now conform to the proposed standards.

Industrial Regulation: CPI firms in the San Francisco Bay area are now

FIRST
IN SERVICE

For solvents, AMSCO's nationwide network of terminals, refineries and storage depots insures you prompt delivery regardless of the location of your plant. Whether you order by barge, tank car, tank wagon or just a drum, specify AMSCO. You'll get what you want, where you want it, when you want it. Let us show you.

AMSCO

AMERICAN MINERAL SPIRITS COMPANY

NEW YORK • CHICAGO • LOS ANGELES

FYI:
Chemical Week Reprints

Long-Range Planning
How to fully realize growth potentials $1 ☐

Propylene
Survey of propylene markets—present and prospects $1 ☐

Cellulose
Outlook is bright, as end-use pattern diversifies, regular outlets grow $1 ☐

Foreign Trade Challenge
Focusing on the U.S. chemical industry's foreign trade problems. $1 ☐

Petrochemical Treasures $1 ☐

Rating Research $1 ☐

Cost Accounting $1 ☐

Ethylene Chemicals $1.50 ☐

World Sulfur $1 ☐

Aromatics in Trouble $1 ☐

Vertical Integration $1 ☐

Steroids $1 ☐

Contract Research $1 ☐

Atomic Energy $1 ☐

Packaged Plants $1 ☐

Ideas from Outsiders $1 ☐

Pharmaceuticals $1 ☐

Market for Waxes $1 ☐

Cost Cutting $1 ☐

Man-Made Fibers $1 ☐

Motivation Research $1 ☐

Petrochemicals $1 ☐

Plastics Outlook $1 ☐

Chemical Week
Reprint Dept., Room 2400
330 W. 42nd Street
New York 36, N. Y.

Please send me the CW Reports checked above. Enclosed is $ .....
Send price of ..... copies

(Bulk prices on request)

living under the threat of another new regulation, which would affect all industry in the area. This proposal would establish air-pollution limits in terms of stringent control standards. Companies in the area are already examining the plan to make sure their operations would be in conformity.

Lithium Litigation

In an out - of - court settlement, Lithium Corp. of America has agreed to pay $1.9 million in a $4-million breach - of - contract suit brought against it by Quebec Lithium Corp. in federal district court at Minneapolis. The suit arose when Minneapolis-based LCA decided to cancel its contract for ore supplies with the Montreal company. Instead, LCA decided to consolidate operations at its Bessemer City, N.C., plant, use ore reserves there. In addition, LCA must pay $415,000 for ore concentrate already delivered but not paid for.

LCA President Herbert Rogers told CHEMICAL WEEK there were two main reasons for the company's switching to its own ores:

(1) LCA believed that Quebec was planning to go into competitive chemical manufacture, which the contract, Rogers says, specifically prohibited Quebec from undertaking.

(2) By using its own ore in the North Carolina reserves, LCA could save money—on freight rates and because of lower operating costs at the Carolina mine. Freight charges alone on moving the ore from Canada to North Carolina would have been $7 million. Moreover, by doing its own mining, LCA could reap a depletion allowance tax advantage.

Under the terms of the settlement, LCA will pay $1 million this year (by Sept. 1). The rest will be paid in $25,000 monthly installments at 3% interest for 36 months.

This system of payment allows LCA to gain a valuable tax-loss credit, Rogers says. The $1.9-million obligation puts LCA in the red for '59, and under the law it can carry its tax loss back to '56. This means the company will get a $700,000 tax refund on the $1 million obligated this year. Consequently, about 55% of the total $1.9 million will be paid out of tax refunds.

LABOR

Long Strike Over: After 191 days, strikers at American Oil Co.'s Texas City, Tex., refinery voted to ratify a new contract with management, end the Texas Gulf Coast's and Amoco's longest refinery strike.

The new contract with Oil, Chemical & Atomic Workers Local 4-449 provides for improvements in funeral leave and holiday pay, a severance plan providing a cash payment, and other benefits.

The "management rights" clause, detailing management's prerogatives in assigning workers, remains the same as in the former contract, while a clause concerning job assignments was rewritten. Dispute over these clauses was at the heart of the struggle.

The new contract also calls for a wage reopener in June '60. The contract is effective until June 30, '61.

•

Long Pact: At Columbia-Southern Chemical Corp.'s Barberton, O., plant, management and Local 1, Allied Chemical and Alkali Workers Union, have agreed to a two-year extension of their labor contract covering 1,500 hourly paid workers. The old pact was due to expire June 27, '60, one of the longest labor agreements among major chemical producing plants (it was for a five-year span).

The new contract calls for an undisclosed basic wage increase, retroactive to Nov. 1, '59, and an increase of 3% annually in '60 and '61. It also calls for improved benefits and pension improvements.

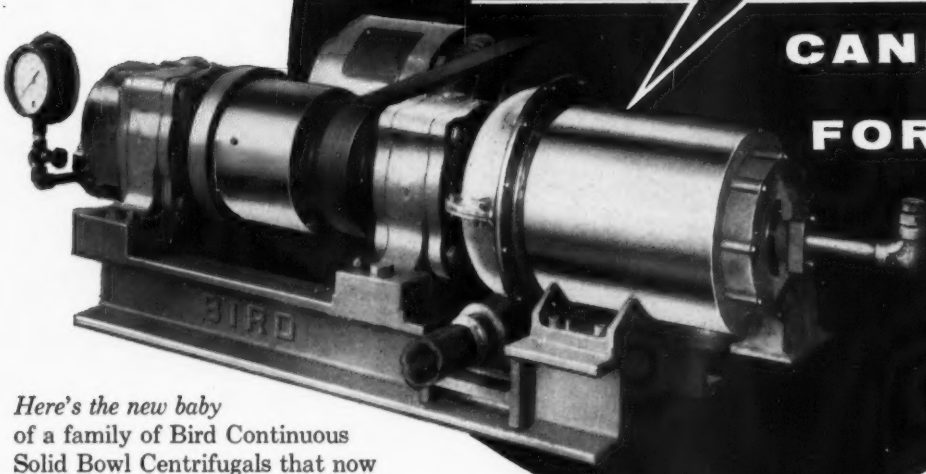
•

Walsh-Healey: Late word from the joint deliberations of Oil, Chemical & Atomic Workers Union and International Chemical Workers Union preparing testimony for hearings on minimum wage determinations indicate they will ask for a $2/hour floor. Hearings will be held next week in Washington, D.C. (*CW, Jan. 16, p. 31*).

OCAW, commenting on preparations, says, "while [a] statement has not been finally drafted, preliminary studies indicate [we] will be in position to support a minimum wage of more than $2/hour."

Current forecasts indicate a hefty rise in the minimum, but not to $2.

LOOK WHAT THIS BIRD CENTRIFUGAL WITH 6″ SOLID BOWL CAN DO FOR YOU!



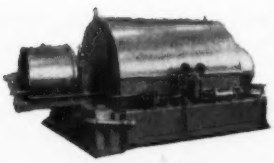
Here's the new baby of a family of Bird Continuous Solid Bowl Centrifugals that now covers *seven sizes.*

PRODUCTION OR PILOT WORK The Bird 6″ is built for round-the-clock operation or for dependable pilot plant service.

HIGH CAPACITY operating continuously at speeds up to 6000 rpm, this little unit accepts feed slurries up to 10 gpm or more — delivers solids at the rate of 500 pounds per hour or higher.

GREAT FLEXIBILITY like its bigger brothers, the Bird 6″ separates coarse or fine solids from concentrated (50%) or dilute (1%) slurries, hot or cold; on test work, speeds of both bowl and solids conveyor can be varied during operation. Bowl and conveyor are cantilever supported for quick and easy change, inspection or cleaning.

IN SMALL SPACE overall length is less than 48 inches, height only 15½ inches. The Bird Research and Development Center is geared up to help you select the one best design (there are 25 variations) to do the best separating job at the lowest cost.



THIS BIG BIRD, by way of contrast, has a 54″ x 70″ solid bowl — delivers up to 70 tons of dried solids per hour — 400 gallons of clarified liquid per minute.

BIRD MACHINE COMPANY • South Walpole, Massachusetts

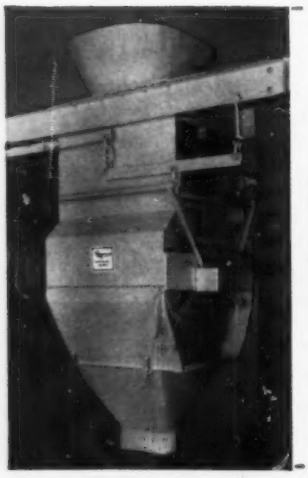
Regional Offices: **EVANSTON, ILLINOIS • ALAMO, CALIFORNIA • ATLANTA 9, GEORGIA**

BIRD CONTINUOUS SOLID BOWL CENTRIFUGALS

Mr. Executive:

Is your bag filling operation as economical as you would like?

demand ACCURACY SPEED LOW MAINTENANCE!



THE RAYMOND
ROTOMATIC
BAG PACKER
Gives you all 3!

If your business involves packing chemicals, fertilizers, feed, seed or any free or semi-free flowing materials in open mouth bags, then investigate the Raymond Rotomatic Bag Packer. It is fully automatic, all mechanical. Requires no outside motivation such as electricity or compressed air. The Raymond Rotomatic Packer is gravity operated and uses the even balance scale principle to deliver proved accuracy, speed and low-cost maintenance. *Send complete information to:*

Name_____

Firm_____

Address_____ Zone____ State____

ACT NOW! SEND COUPON TO

Raymond
BAG CORPORATION
A division of Albemarle Paper Mfg. Co.
Middletown, Ohio

ADMINISTRATION

KEY CHANGES

Charles J. Chapman to vice-president, marketing, National Carbon Co., division of Union Carbide Corp. (New York).

Werner Samter to vice-president, production and research, Chemo Puro Manufacturing Corp., subsidiary of Century Chemical Corp. (New York).

H. R. Mustard to vice-president, finance, Pittsburgh Coke & Chemical Co. (Pittsburgh).

Robert N. DuPuis to vice-president, research, General Foods Corp. (New York).

Perce C. Rowe to group executive vice-president, United States Rubber Co. (New York).

Gordon A. Ogden to executive vice-president, International Division, International Latex Corp. (New York).

Melvin Hochberg to board of directors, Nopco Chemical Co. (Newark, N.J.).

Theodore G. Klumpp to board of directors, Sterling Drug, Inc. (New York).

Roderic L. O'Connor to boards of directors of Ciba States Ltd. and Ciba Pharmaceutical Products, Inc. (New York).

William R. Thomas to board of directors, Cutter Laboratories (Berkeley, Calif.).

Harold B. Seligman to vice-president and general manager, **Jerome Harrison** to vice-president and director, marketing, Organic Chemicals Division, Witco Chemical Co., Inc. (New York).

DIED

George Avery Bunting, 89, founder of Noxzema Chemical Co. (Baltimore).

Edward R. Snyder, 74, former executive vice-president, Barrett Division, Allied Chemical & Dye Corp., at Montclair, N.J.

KUDOS

To **Wallace R. Brode,** science advisor to the Secretary of State, the American Chemical Society's 1960 Priestley Medal.

CHEMICALS OUTLOOK

January, 1960

This news bulletin about Wyandotte Chemicals services, products, and their applications, is published to help keep you posted. Perhaps you will want to route these and subsequent facts to interested members of your organization. Additional information and trial quantities of Wyandotte products are available upon request . . . may we serve you?

CALCIUM CHLORIDE AIDS DEEP-WELL DRILLING

In 1953, 26 oil wells were drilled below 15,000 feet. Last year, the total was over 200.

The trend is thus clearly defined. And one of its effects is wider application of recent discoveries in deep-well drilling techniques . . . several of which make important use of calcium chloride. Among these are:

Shale-control muds . . . consisting, for example, of one part calcium chloride, two parts calcium hydroxide, and three parts lignosulfonates. The calcium chloride coagulates colloidal particles, prevents dispersion and swelling of shale, and keeps shale particles from gumming up the mud. It also adds weight to the mud.

Oil-based muds . . . in which calcium chloride is employed to form water-in-oil emulsions by reaction with resin-type oil-soluble (water-insoluble) soaps.

Completion fluids . . . which, by filling the annular space between the tubing and the larger-diameter casing, help hold back tremendous bottom-hole pressure in a newly drilled well before it begins producing. Various liquids have been tried for this purpose. None have proved as satisfactory as calcium chloride solution — either because they are not heavy enough, or (in the case of muds) because they settle out, forming a solidified layer at the bottom that is difficult to remove.

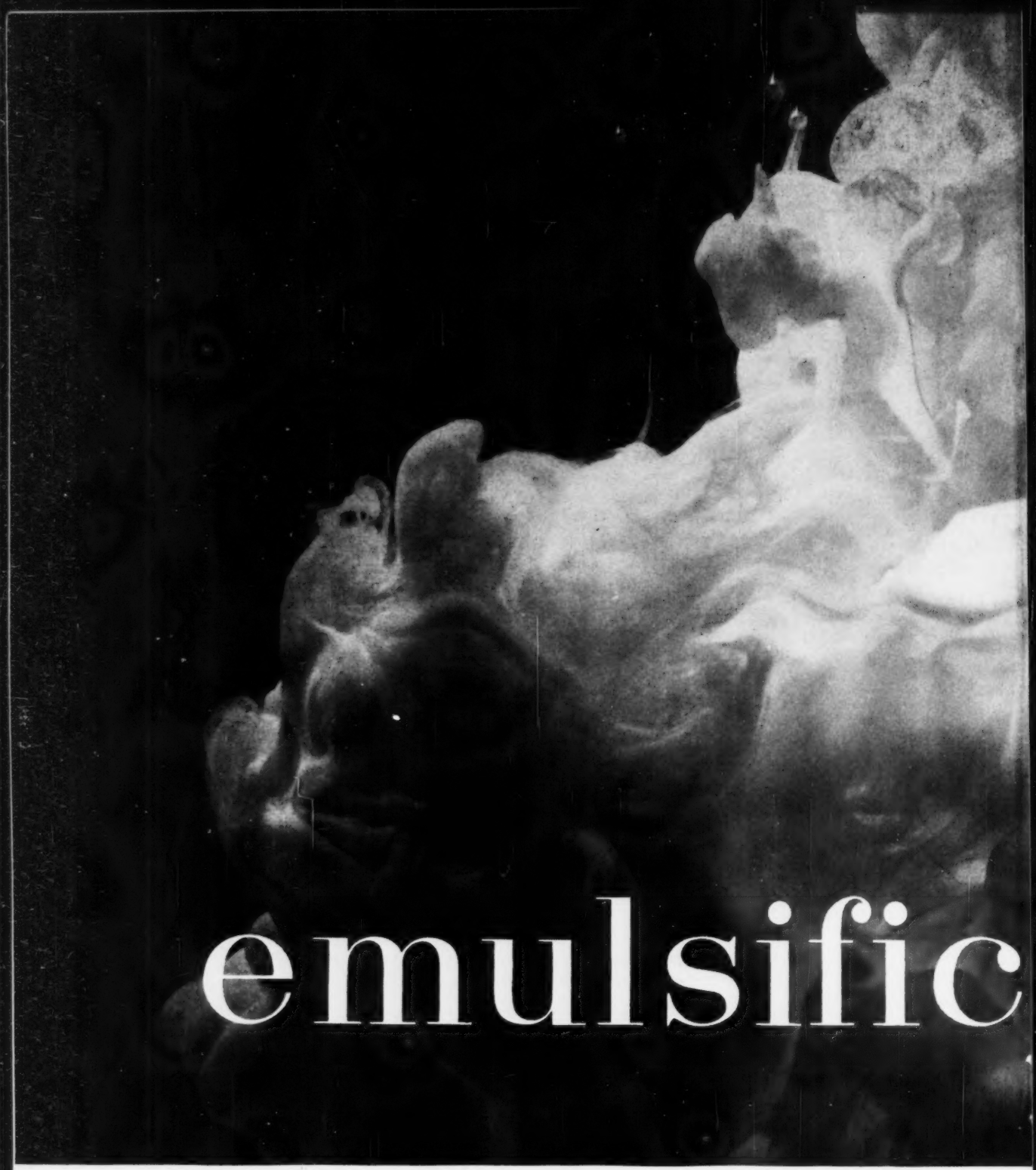
Cementing . . . to shut off water that might otherwise drown a well before full production has been realized. Mix is pumped directly into the casing to the bottom of the hole; calcium chloride gives high early strength, better workability, and shortens the curing period.

Calcium Chloride is just one of many raw-material chemicals supplied by Wyandotte to the petroleum industry. Others include drilling-mud additives, materials for gas dehumidification, demulsifying, emulsifying, secondary recovery, water treatment, and sweetening.

Wyandotte CHEMICALS

WYANDOTTE CHEMICALS CORPORATION
WYANDOTTE, MICHIGAN • OFFICES IN PRINCIPAL CITIES

SODA ASH • CAUSTIC SODA • BICARBONATE OF SODA • CALCIUM CARBONATE • CALCIUM CHLORIDE • CHLORINE • MURIATIC ACID • HYDROGEN • DRY ICE
PROPYLENE DICHLORIDE • SYNTHETIC DETERGENTS • SODIUM CMC • ETHYLENE OXIDE • ETHYLENE DICHLORIDE • POLYETHYLENE GLYCOL • PROPYLENE OXIDE
GLYCOLS • POLYPROPYLENE GLYCOL • DICHLORODIMETHYLHYDANTOIN • CHLORINATED SOLVENTS • OTHER ORGANIC AND INORGANIC CHEMICALS



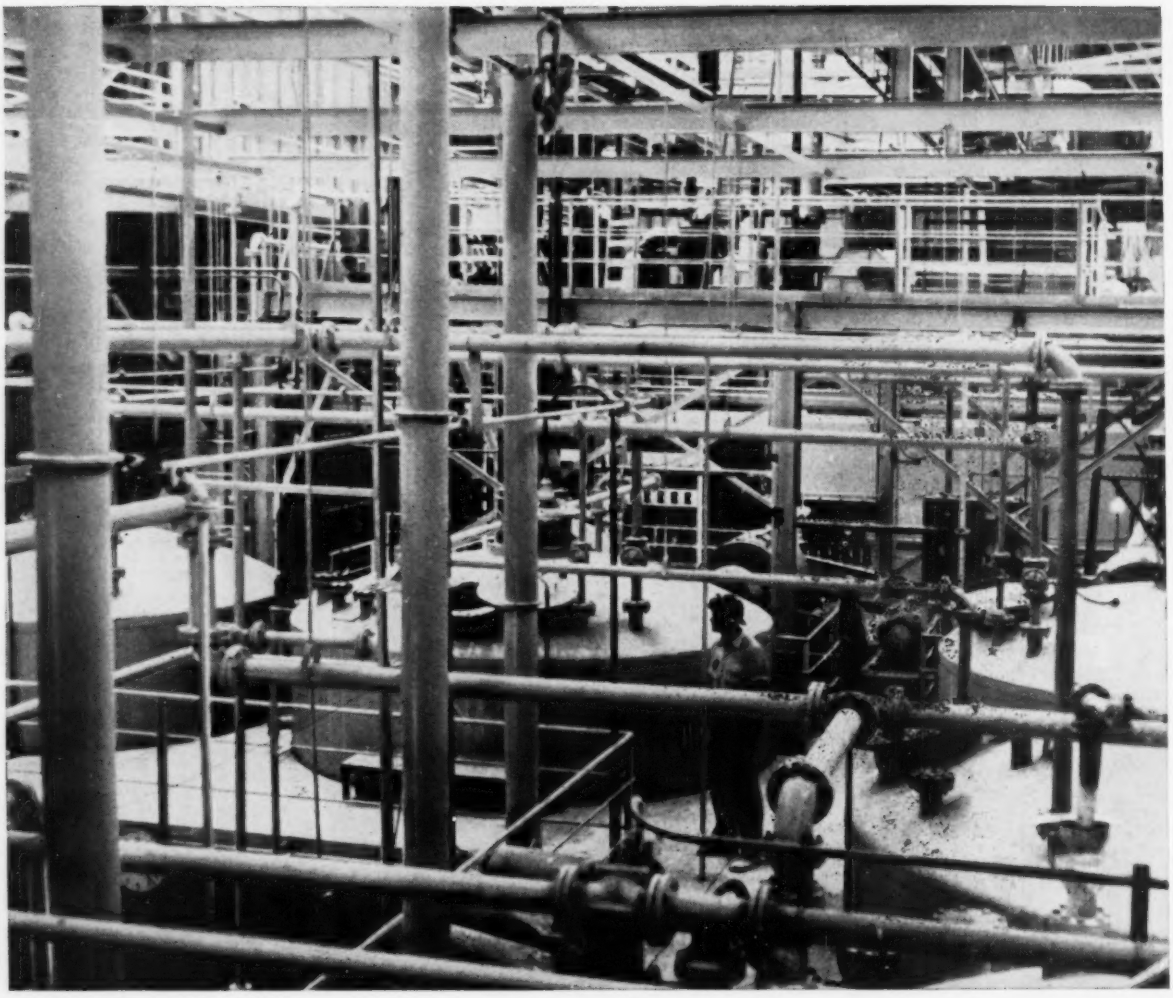
Picture shows "Bloom"—spontaneous emulsion of oil and emulsifier in water.

Want to make oil and water mix? See Atlas, leading producer
SPAN®, TWEEN®, BRIJ®, MYRJ® *and others.*

of non-ionic surface active agents:
Write Dept. M for information.

ATLAS
POWDER COMPANY
Wilmington 99, Delaware

DOW | **SARAN LINED PIPE**



Saran Lined Pipe . . .

process lifeline with a hot acid cargo

When a complex piping system carries corrosive process liquors . . . when it must withstand constant thermal stress imposed by its high-temperature cargo . . . corrosion resistance and high physical strength are the keys to pipeline dependability.

The maze above is of Saran Lined Pipe, and is a part of the process piping at American Cyanamid's Savannah plant, Savannah, Georgia. Most of this pipe carries process liquors with a sulfuric acid content of 25% . . . at temperatures of 165° F. and above. Pumping pressures range upward to a maximum of 70 psig.

The chemical activity and high temperatures of the pipe's contents are severe threats to pipeline durability, but thanks to the extreme corrosion resistance and high strength of Saran Lined Pipe it has performed dependably for American Cyanamid since installation four years ago.

Similar sections of Saran Lined Pipe carry hydrochloric acid in concentrations as high as 37%, while others are used to transfer 10% caustic soda. In many areas other types of corrosion resistant piping have been replaced with new Saran Lined Pipe, with highly satisfactory results.

When processing systems require piping that must resist corrosion and chemical activity, under a wide variety of conditions, consider dependable Saran Lined Pipe. Saran Lined Pipe, fittings, valves and pumps are available for systems operating from vacuum to 300 psi, from below zero to 200° F. They can be cut, fitted and modified easily in the field without special equipment. For more information, write Saran Lined Pipe Company, 2415 Burdette Avenue, Ferndale, Michigan, Department 2280AM1-23

THE DOW CHEMICAL COMPANY • MIDLAND, MICHIGAN

Design Sets the Pace for Profits

There was a note familiar to CPI management in last week's statements about steelmakers' problems. U.S. Steel's Roger Blough said it now costs six times as much to build an open-hearth shop as it did 30 years ago. For the process industries, too, installation costs have increased staggeringly. And designing to keep costs down has brought management abruptly to the concept of "underdesign" (i.e., undercapacity).

The idea is basically a more realistic approach to plant planning —cut out are the small design extras that will likely result in a plant's being able to produce more than the supposedly firm specifications. The simplicity, the obviousness of the concept are admitted; but CPI management has become so oriented toward overdesign that acceptance of underdesign has been slow.

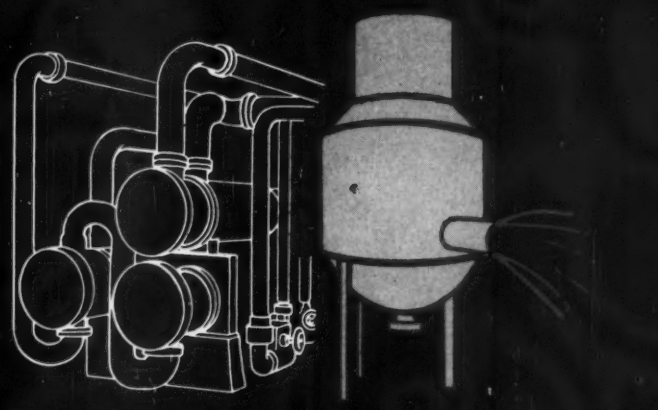
One consulting engineering group, now plugging underdesign, gave CHEMICAL WEEK a striking example of the tendency in its own firm and in industry to overdesign: a refinery built some years ago to handle 5,000 bbls./day of crude has been regularly processing 10,000 bbls./day.

CHEMICAL WEEK found cost-conscious management blaming this sort of overdesign on three basic things: overdesigned standard parts; uncertainty in design data; and—more fundamentally—management's tendency to welcome hidden capacity to meet expanding markets.

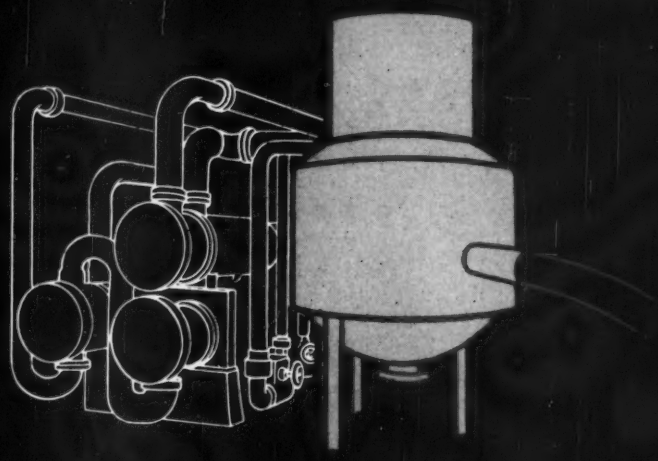
Whether it is wise to welcome hidden overdesign, however, is being critically re-examined. Recently C. H. Thayer, Sun Oil's vice-president of manufacturing, said, "Perhaps due to lack of basic knowledge of engineering and chemical design factors, as well as the inherent optimism of refiners . . . refinery units built during the past 20 years have usually contained enough 'rubber' to be stretched . . . 20, 50, or even 100%, beyond their original design capacity. Now, with . . . the necessity of paring initial costs to the bone, the newer plants are proving less stretchable."

It's important to distinguish overdesign from "deluxe" design. A syn-

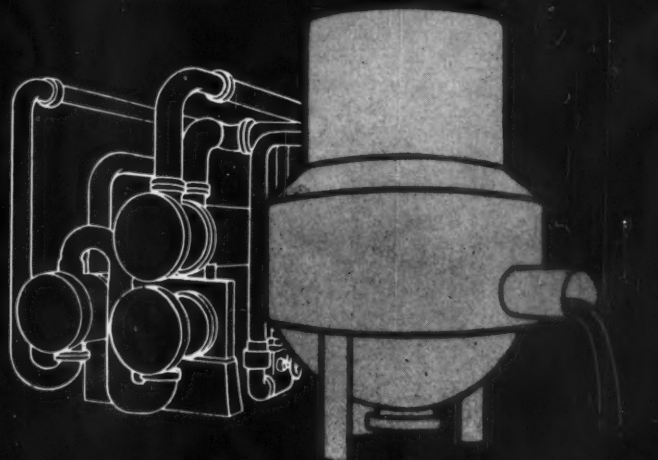
ENGINEERING



UNDERCAPACITY minimizes initial investment, but also limits capacity to meet foreseeable market demands.



OPTIMUM CAPACITY minimizes investment per unit of capacity, yields maximum profit-investment ratio.



HIDDEN OVERCAPACITY wastes investment dollars, dilutes profits realized on the marketable amount of product.

thesis plant, for example, might be built to standard specifications for $3 million. Special equipment demanded by a plant purchaser would add about $50,000 to the cost. But 15% overdesign would add $250,000 to plant cost.

Cyanamid's Way: CHEMICAL WEEK found management, even when aware of the high cost of overdesign, uncertain about how to ensure its elimination. One of the few companies with a fixed approach to the matter—and willing to talk about it—was American Cyanamid. General Manager R. M. Nee explained the two guiding principles:

(1) "Minimum adequate design": Those parts of a plant that are designed from experience rather than from calculations (e.g., concrete surfacing and the inlet connections to a distillation tower) are kept at a minimum adequate for the service.

(2) "Ninety - percent - acceptance": Company policy has determined that an operating division must accept a new plant from the E & C Division if it works at 90% of capacity during startup trials.

These principles are backed up by company procedures. The "minimum adequate" concept is enforced by policing. "Not only do we carefully inspect engineering drawings and specifications," says G. A. Forlenza, manager of process engineering, "we also inspect construction projects and operating plants. When we see anything that looks better than the service requires, we note it and check on it."

Management followup on the "90% acceptance" concept encourages engineers to specify everything exactly.

Forlenza's example: When bids were solicited on a melamine autoclave for a new plant, one vendor said that he could provide an autoclave with a much higher-than-specified capacity for very little more money. The decision was "no." Reason: since the rest of the plant had no excess capacity, it couldn't be used in the autoclave—at any price.

Design methods in Cyanamid's E & C Division are closely controlled by detailed specifications for process as well as for engineering design. However, the company deliberately avoids official data books, says they don't warrant the expense of keeping them up to date. Forlenza explained that the E & C Division tries to limit its work to new types of processes producing new products. It is company policy to contract with engineering companies for standard plants, since competition among the contractors will keep these costs to a minimum.

Firm Control: Indications are that it is the minimum adequate acceptance part of Cyanamid's policy that is most helpful in overcoming the three previously mentioned causes of hidden overdesign (standard parts; uncertainty; management attitude).

- Standard parts: Made for a fixed capacity level, these have been overdesigned for intermediate ranges in the past. But today, says Cyanamid, the gigantic size of the modern CPI companies makes possible a broad range of standard parts sized to fit almost any capacity.
- Uncertainty: In the past, lack of accurate design data sometimes required the use of a "fudge-factor" to ensure meeting requirements. Now again, a combination of long operating experience and continuous research has reduced to less than 5% the uncertainty in most design data. And the advent of computer techniques in engineering design makes it possible for designers to discover the exact optimum conditions for each operation.
- Management's attitude: Clearly, Cyanamid is anything but indifferent to overdesign. Consultants told CHEMICAL WEEK, however, that it is indifference that leads engineers to conceal it in their designs and specifications. And management's attitude has frequently lagged behind the technological advances.

Several companies point out that formerly overdesign was concealed even in plants sold under competitive bidding by the engineering contractors. And managers came to regard it as a sort of bonus indicative of the quality of the engineering work. Frequently, manufacturing companies would complain if a new plant was not good for at least 20-30% overcapacity.

When made aware that they were paying for this overcapacity, they rationalized that the additional cost was depreciated at a rapid rate, and gave flexibility to meet future demands. This attitude, Cyanamid believes, must be eliminated.

To Overdesign Is to Be Human: As one contractor put it: "It's the fellow third-row-back in the line of desks who puts the overdesign in a plant. He knows that if he overdesigns, nobody will say anything. But if he designs too tight he's in trouble."

Process piping offers the best example of hidden overdesign that sneaks into a plant unless the engineers are directed, as at Cyanamid. The piping in a 5,000-bbls./day alkylation unit had been sized according to the operating department of a large refiner. It was decided to change the capacity for the unit from 5,000 bbls./day to 9,000—with the 9,000 figure to be a realistic one. A consulting engineering company, scaling up the piping of the smaller unit, and using its "underdesign" specifications, found need to change only one line. Piping costs for the original plant approached 30% of the $2.5 million total material costs.

Divided Responsibility: Although engineers have the ultimate responsibility for sizing plants, the primary job of determining plant capacity belongs, of course, to market researchers. As Cyanamid's Nee put it, "We're engineers, not forecasters." When Cyanamid's commercial division has established an optimum capacity for a new plant, the E & C Division designs for exactly that capacity. And uncertainty in the data or methods is expected to deviate to the minus, as well as to the plus, side of the specified point. In this manner, engineering management frees engineers to skim the last bit of extravagant overdesign from each plant.

When responsibilities for setting capacity and designing to it are divided, engineers are confident that they are more accurate than market researchers. Virtually all engineering companies tell CHEMICAL WEEK that engineering designs can be accurate to plus or minus 5%; whereas market forecasts, which must cover periods from three to five years ahead to be useful, are only accurate to within 10% for existing products and to within 20% for new products.

This makes it plain that if management wants to allow for poor market guesses by overdesign, it must be prepared to pay for it. But rigorous attention to underdesign will allow engineers to hit management's firm forecasts almost on the head.

TRIPLE-TESTING assures SUPER PURITY AROMATICS

Delhi-Taylor Benzene, Toluene and Xylenes are precision processed for extreme purity. They are sulfur and thiophene-free, with a remarkably low paraffin content. What's more, a unique triple-testing procedure keeps a watchful eye on product purity. Delhi-Taylor aromatics are tested on-stream to assure high processing standards . . . in storage to make certain of the stability of the product . . . and finally just before shipment to the customer. Test results of this final sample are sent along with the shipment.

Delhi-Taylor's rigid quality control program is your assurance that our high purity aromatics will readily meet your most stringent specifications.

Send today for a copy of our new Specifications Folder.

DELHI TAYLOR

CHEMICAL DIVISION

DELHI-TAYLOR OIL CORPORATION

CORRIGAN TOWER, DALLAS 1, TEXAS

415 MADISON AVE., NEW YORK 17, N. Y.

CORPUS CHRISTI • CHICAGO • CHARLESTON • BATON ROUGE • HOUSTON

You can depend on
Mississippi Lime Company
for ABOVE STANDARD

CALCIUM CARBONATE

Pigments such as Precipitated Calcium Carbonate U.S.P. and pulverized limestone are microscopically examined. A file of permanent micro slides is kept for reference.

We start with a raw material of superior quality. Mississippi Lime Company's entire limestone deposits test 99% pure calcium carbonate . . . a natural purity and uniformity unequalled in such quantity anywhere.

This pure limestone—through a series of carefully controlled processes—is then converted to various grades of calcium carbonate including Precipitated Calcium Carbonate U.S.P. and Technical. *Each of these grades is uniformly above the accepted standard.*

If you have use for calcium carbonate in your formulations, "Mississippi" has just the right grade to meet your most exacting requirements. Our skilled technicians will consider it a privilege to assist or consult with your technical staff.

Immediate shipment in *any quantity anywhere,*
BY BARGE . . . BY RAIL . . . BY TRUCK

MISSISSIPPI LIME COMPANY
ALTON, ILLINOIS

ENGINEERING

Record Recorder

General Electric Co. last week demonstrated its new thermoplastic laboratory recording systems, called TPR. TPR's unique combination of high storage density—up to 40 million information "bits" per square inch—and simplicity of recording and retrieval holds great promise, GE feels, for solving increasingly complex data-handling problems, in both military and industrial applications.

Guy Suits, GE's vice-president and director of research, compared TPR to the ancient hieroglyphic recording technique, with stone tablets replaced by thermoplastic film, the chisel replaced by an electron beam. Here's how it works:

The tape on which records are stored consists of three layers—a high-melting plastic base, topped with an electrically conductive coating and a thin top layer of thermoplastic. As the tape moves lengthwise through the recording machine, an electron beam, scanning from side to side, creates discrete electrical charges on the surface. The tape is then heated sufficiently to soften the thermoplastic, which becomes indented as the charged areas are attracted to the conducting coating. Cooling of the tape "freezes" the data record in the thermoplastic layer as a series of dents or ripples. The record can be removed and the tape reused by heating to a higher temperature so that the charges leak away and surface tension smooths out the surface.

Playback Versatility: Because the electron beam can be modulated in several ways, TPR can handle data input and storage in either analog or digital form. Playback is accomplished by an optical system that projects light through the film and onto a screen.

Pictures can be recorded on the tape—in black-and-white and in color — by sequential scanning (GE demonstrated recording of television signals). Optical reproduction requires a projection system equipped with a special grating; electrical reproduction requires addition of a flying-spot scanner or camera tube. The ability to make pictorial records without the chemical processing required for conventional photographic film is expected to be a valuable addition to technical data-storage techniques.

TPR should have a decided edge

MEETS YOUR COMPLETE NEEDS FOR

organic di-valent sulfur compounds

R-S-R / R-SH / R-S-S-R

COMPLETE MODERN PRODUCTION FACILITIES

. . . especially suited to organic di-valent sulfur compound manufacture. Eliminates investment in special equipment not in full-time use.

EXPERIENCED RESEARCH AND DEVELOPMENT STAFF

. . . saves you money on process development costs.

AVAILABLE IN COMMERCIAL QUANTITIES

Mercapto Acids, Thioethers, Disulfides, Thiophenols, Amino Mercaptans, also Alkyl and Aryl derivatives of the above classes of compounds. Or Evans can tailor your sulfur compound requirements.

Add this plant to your present facilities... **at no extra cost!**

For full information, fill in and mail coupon today.

EVANS CHEMETICS INC.
250 E. 43rd St., New York 17, N.Y.

☐ Send me a complete list of available organic di-valent sulfur compounds.
☐ I would like additional information on

_____

☐ Have your representative call me

Name _____

Position _____

Address _____

Company _____

If you use...

EPSOM SALTS

And want...

Top quality, personalized service, fast delivery

It pays to call on...

BERKSHIRE CHEMICALS, Inc.

630 Third Ave., New York 17, N.Y. Telephone: YUkon 6-8855

SALES OFFICES: New York · Chicago · Philadelphia · Cleveland · Boston
Pittsburgh · San Francisco

GOOD NEWS ABOUT VEEGUM®!

VEEGUM solves formulating problems wherever aqueous systems require a thickener, suspending agent, or emulsion stabilizer. It is also useful as a binder and disintegrator for tablets. VEEGUM is colloidal magnesium aluminum silicate, with thixotropic properties. Our regular grade of VEEGUM is the most economical and versatile. However, for certain uses we offer additional special grades of VEEGUM. The following grades are available:

VEEGUM — regular grade, small flakes.
VEEGUM HV — high viscosity, small flakes.
VEEGUM WG — powder, for tablets.
VEEGUM F — microfine, for tablets and ointments.
VEEGUM T — industrial use.

R. T. VANDERBILT CO.
SPECIALTIES DEPARTMENT
230 Park Avenue
New York 17, N. Y. P-16

Use Coupon for Fast Action
( ) Please send literature
( ) Please send sample
Specify grade _____
State application _____
Name _____
Title _____
(Please attach to your Company letterhead)

over magnetic tape, says GE, because it affords a wider band width (50 megacycles for TPR vs. 5 for magnetic tape) and can accommodate 100 times as much data in a given space. GE emphasized, however, that thermoplastic recording is still in a very early stage of development, won't be competitive with established photographic and magnetic tape systems for some time to come.

Earliest applications are expected "in about a year" in military equipment such as radar, infrared detection, electronic countermeasures, missile guidance and radio communications. But GE is confident that, in the long run, TPR will play an important role in rapidly growing automation of business and industrial processes.

New Oil Hunter

A new oil-hunting technique, employing nuclear magnetic resonance to spot underground oil, natural gas and water, was unveiled last week by Standard Oil of California. It's the Nuclear Magnetism Log, developed jointly by Cal Standard and Borg Warner scientists.

One advantage claimed for NML is its ability to distinguish between recoverable oil and that which is bound in underground formations. Offsetting this advantage to some extent is the slower logging speed of the device. Unlike conventional sonic and neutron logging instruments, which record continuously while traveling through the borehole at rates of 3-4 ft./second, NML must be stopped intermittently for recording intervals of several seconds. The slower operation holds up rigging crews, adds to costly drilling time. Also, NML's price will be "fairly substantial."

Oleic Derivatives

Researchers at Commonwealth Scientific and Industrial Research Organisation (Melbourne) have succeeded in producing a lube-oil-like ester of 2-octylsebacic acid. It is said to have both low-temperature mobility and high-temperature stability. CSIRO workers also say related research indicates esters of 2-hydroxy-2-octylsebacic may be as attractive as phthalates for use as plasticizers. They are, however, less stable—and therefore less efficient—than unsubstituted esters for lubricant applications.

For Outstanding Heat, Light and Water Resistance in Your Vinyl Products

Standardize on PEROXIDOL 780

RCI's New Polymeric Plasticizer

PEROXIDOL 780 is an epoxy-type plasticizer which can be employed in vinyl processing either to boost heat stability or to reduce stabilizer content for equivalent stability. Economically priced, PEROXIDOL 780 is light in color, easy to process and does not volatilize in production. Higher processing speeds are assured by its unique combination of stabilizer action, good wetting properties and low volatility, and both the light stability and color retention of compounds incorporating 780 are excellent.

PEROXIDOL 780 can be used in calendering, extruding and molding operations . . . in plastisols, organisols, solution coatings and dispersions. Rainwear, garden hose, wading pools and lawn furniture cushions plasticized with 780 are characterized by their ability to withstand exposure to all kinds of weather . . . and by their strong resistance to water, soap and detergents, and oil.

Write RCI's Chemical Division today for your copy of their PEROXIDOL Bulletin, which contains specifications and complete information on this versatile plasticizing agent.

REICHHOLD

Synthetic Resins • Chemical Colors • Industrial Adhesives • Phenol
Hydrochloric Acid • Formaldehyde • Glycerine • Phthalic Anhydride
Maleic Anhydride • Sebacic Acid • Ortho-Phenylphenol • Sodium Sulfite
Pentaerythritol • Pentachlorophenol • Sodium Pentachlorophenate
Sulfuric Acid • Methanol

REICHHOLD CHEMICALS, INC.,
RCI BUILDING, WHITE PLAINS, N.Y.

Creative Chemistry . . . Your Partner in Progress

Louisville Dryer—10 feet in diameter, 10 stories long!

Turn a ten story building on its side, and there'd be room to spare on either end of this huge pit lathe at Sharon, Pennsylvania where this 10′ x 110′ Louisville Dryer was fabricated.

This lathe is used for machining the reinforcing bands onto which are mounted the forged steel tires. This careful workmanship assures concentricity of the completed dryer shell—a primary factor in efficient seal operation.

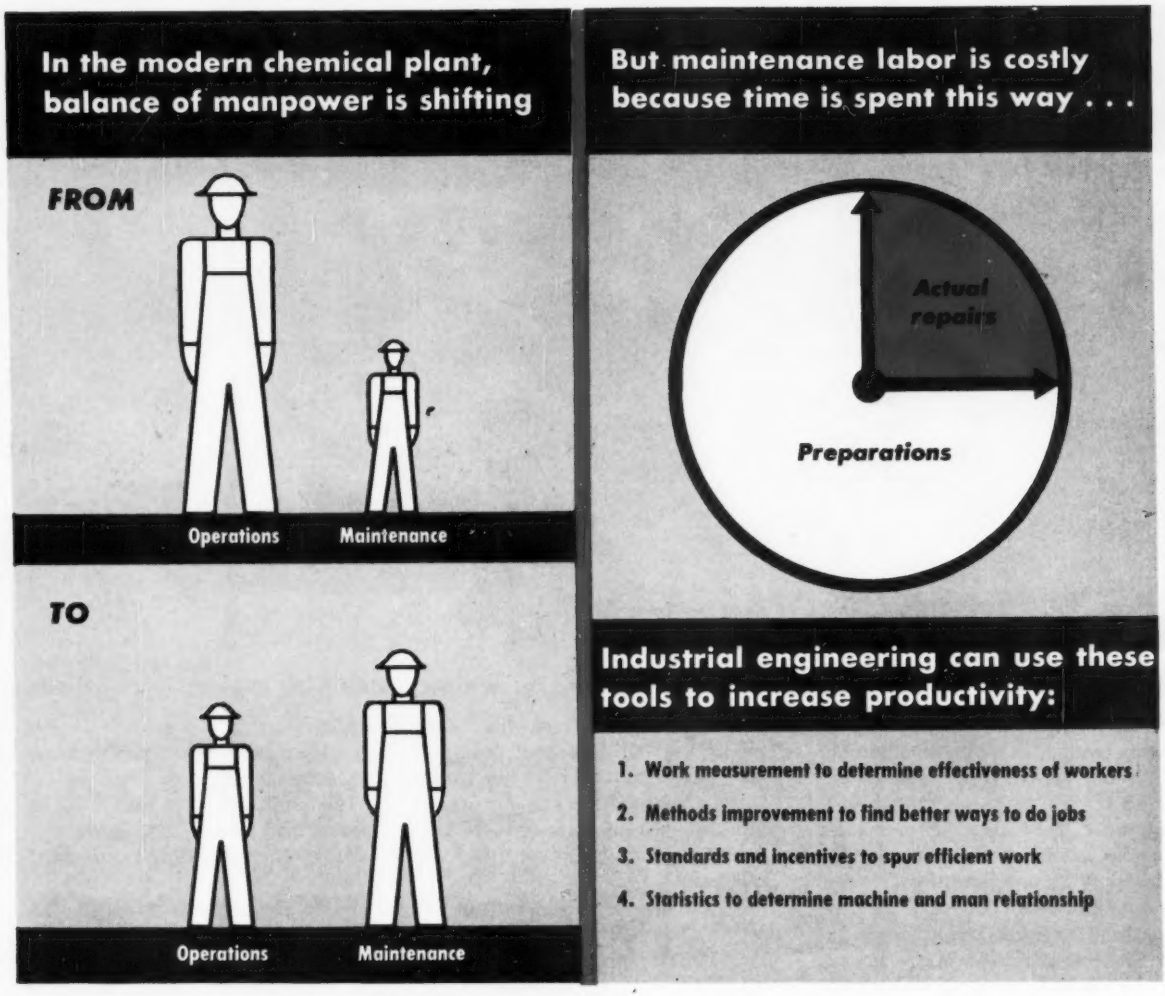
Every Louisville Dryer is especially designed, manufactured, assembled and installed for its specific task.

If you have a problem involving process equipment, call or write our equipment specialist in your area. Here, as in so many fields, you'll find IT PAYS TO PLAN WITH GENERAL AMERICAN.

Process Equipment Division
GENERAL AMERICAN TRANSPORTATION CORPORATION
135 South LaSalle Street, Chicago 3, Illinois
Offices in Principal Cities
In Canada: Canadian Locomotive Co., Ltd., Kingston, Ontario

PROCESS EQUIPMENT DIVISION GENERAL AMERICAN TRADE MARK

Louisville Dryers


In the modern chemical plant, balance of manpower is shifting
FROM
Operations
Maintenance
TO
Operations
Maintenance
But maintenance labor is costly because time is spent this way . . .
Actual repairs
Preparations
Industrial engineering can use these tools to increase productivity:
1. Work measurement to determine effectiveness of workers
2. Methods improvement to find better ways to do jobs
3. Standards and incentives to spur efficient work
4. Statistics to determine machine and man relationship

Fat Target for the Industrial Engineers

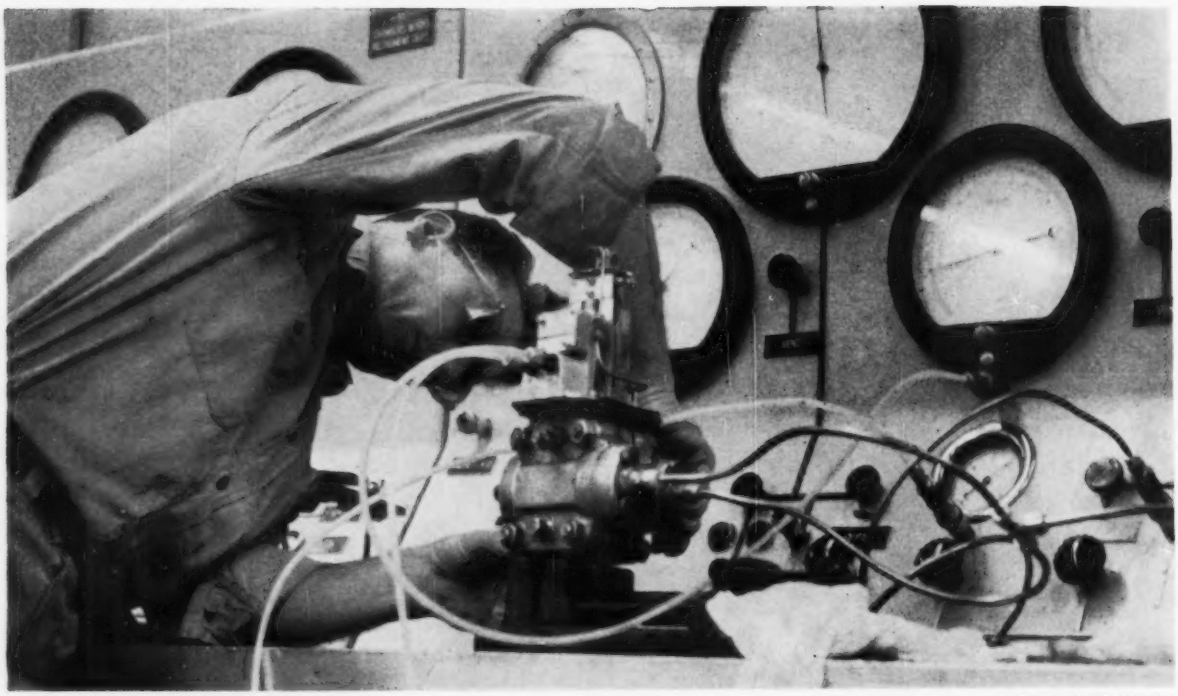
Next week's Plant Maintenance & Engineering Conference in Philadelphia's cavernous Canvention Hall will place new emphasis on industrial engineering and cost control rather than traditional topics such as training and preventive maintenance. And maintenance management from chemical companies will be more than casually interested. Here's why:

Maintenance productivity levels, even in plants already using industrial engineering techniques, are usually below 50%. One chemical company reports work levels of 40%, another 35%—and these figures are derived by counting as productive, time taken for job planning, drawing reading, sketch making and cleanup after job completion as well as the actual repair time. The remaining 60-65% of the time is nonproductive, is spent traveling to and from the job, waiting for materials, etc.

Moreover, Du Pont studies of actual repair time show that when it is unplanned, only about 25% of the time is spent in making the repairs. The other 75% is spent in disassembling the equipment to get at the part to be repaired, reassembling after the repairs (*CW, April 25, '59, p. 79*).

If maintenance was still a small service function, these figures might go practically unnoticed. But in many of the newer, highly automated chemical plants, at least half, and in some cases as much as 60%, of the labor force is in maintenance. Even in the average chemical plant where only about 20% of the labor force is in maintenance, the average is the highest of any industry. Du Pont reports maintenance increases of 125% in wage roll from '40 to '57 and 150% in over-all cost from '46 to '57 (*CW, June 29, '57, p. 65*).

Tough Translation: Causing the late start in industrial engineering emphasis, which has been a part of operating groups for many years (often taking the form of time study), is the complexity of the maintenance function. It prevents the application of



CW PHOTO—ED WALLOWITCH

Maintenance jobs are often complex, difficult to study by ordinary industrial engineering methods.

standard industrial engineering techniques without careful modification.

As one maintenance engineer explains it: "Smart people do the easy things first. Production jobs are easier for the industrial engineer to study because they are repetitive; maintenance work is varied. And, while the industrial engineer ordinarily claims he needs no personal work experience in the job he is studying, without this experience he can't hope to study highly skilled mechanics who have taken years to learn their crafts."

This is one reason why incentives that are usually associated with industrial engineering are shunned by most chemical plants. "They are the last thing we'd ever think of for maintenance," says the head of industrial engineering at one chemical company.

A maintenance engineer says his company is not sold on incentives; but he's convinced that it will save a plant money to use them. The subject gets back to the problem of finding industrial engineers experienced in maintenance. One engineer is needed for each 15-20 mechanics.

"Elemental time values are quite easily obtained and applied to repetitive production tasks. But we've spent $500,000 in one plant to come up with them for maintenance. We needed one time value for removing a new bolt of a given size; another for a rusty bolt and another for removing it from a spot that isn't readily accessible. And, skilled craftsmen still worked out ways to outsmart us," he explains.

On the Rise: But even without incentives, industrial engineering techniques are the only real way to get targets for keeping maintenance in line. Records won't do because job histories only tell how long a job has taken, not how long it should have taken. For this reason many maintenance supervisors have been doing some industrial engineering work without any real effort to label it industrial engineering.

A few plants have used special motion picture techniques (e.g., using speeds of 50-100 frames/minute) to analyze the basic movements required for a job. But the most common technique is work sampling because it is easily applied, gives quick results.

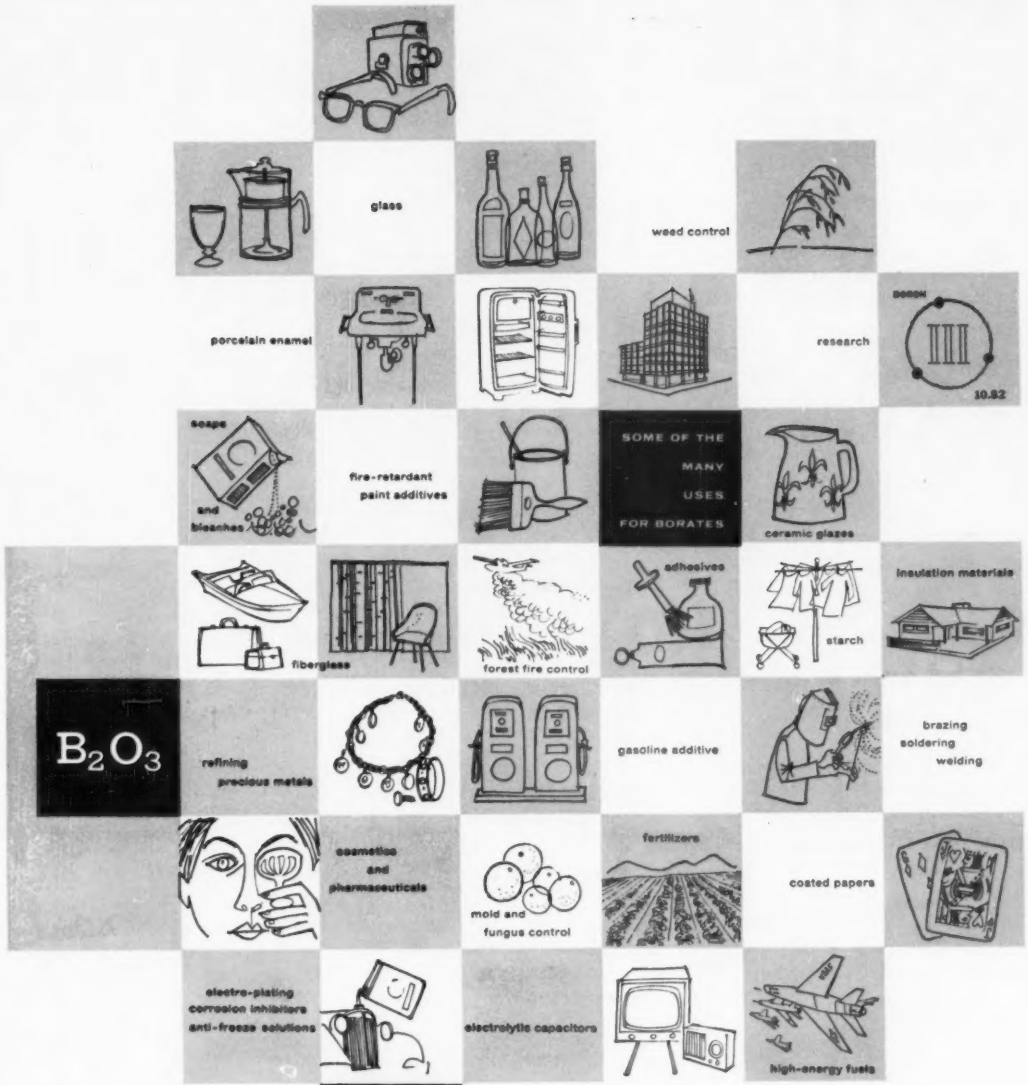
Observers, familiar with maintenance and trained in work-sampling techniques, travel specified routes through the plant, record the percentage of craftsmen working. All others are classified as "in transit" or "waiting." Accumulated averages will bring accuracy to that desired (e.g., one engineer reports 400 or 500 samples are often enough to give plus or minus 5% accuracy).

The craftsmen are kept well informed, and when results are periodically published, productive time usually goes up.

Work simplification or method improvement studies (*CW, Aug. 24, '57, p. 74*) on a job-by-job basis can cut nonproductive effort, result in better job methods and tools.

Job planners are performing industrial engineering functions. And, companies such as Canadian Industries Ltd. have found that detailed planning that breaks down the method for doing the job into a detailed sequence can halve repair time (*CW, Feb. 15, '58, p. 51*). Good planning will prevent craft interference, eliminate one craftsman waiting until another completes his part of the job. And, planning often enables several jobs to be scheduled together. If Du Pont's study of actual repair time holds true, for example, several jobs rather than a single one can be scheduled on a piece of equipment, increasing the percentage of repair time, cutting assembly time.

Administration Needed: "The big savings in maintenance are in eliminating unnecessary work. This calls for



when you want BORATES *look first to the leader and specialist in the field...*

where BORAX is basic

Producing borax and boron products has been our specialty for well over half a century. As a customer, you get many benefits . . . a dependable source of supply, top quality, prompt service. You choose from the greatest variety of borates and boron compounds ever offered . . . many of which are exclusive with us. And, you are welcome to make use of our technical service. For B_2O_3 in any form . . . buy where borax is basic.

UNITED STATES BORAX & CHEMICAL CORPORATION

50 ROCKEFELLER PLAZA, NEW YORK 20, N.Y. • 630 SHATTO PLACE, LOS ANGELES 5, CALIFORNIA

FROM MINE—TO REFINERY—TO YOU...EVERY FORM OF BORATE FOR EVERY POSSIBLE USE

topnotch administration of the department. But many department supervisors are doing industrial engineering work in their spare time, "can't devote their full time to administration," says one chemical company's maintenance head.

One solution: set up a "how to do it better" group within the maintenance department, divorced completely from the routine maintenance activities. For example, the industrial engineering staff at Union Carbide Chemicals' Texas City plant is actually based in the maintenance department, although it carries out industrial engineering jobs for all plant departments. If emphasis on industrial engineering in maintenance continues at its present pace, it seems certain that many plants will follow this practice, eventually set up industrial engineering groups responsible only for maintenance functions.

EQUIPMENT

Asbestos Gasket Tape: Union Asbestos and Rubber Co., Fibrous Products Division (Bloomington, Ill.), is offering a new asbestos gasket tape that fits around bolts and studs. It eliminates the need for separate gasketing on both sides of the bolts and studs or the in-plant perforation of broad gasketing before use. Size openings: Style 746, a wire-inserted folded tape, ⅛ in. to ⅞ in.; Style 738, a wire-inserted flat tape, ⅛ in. through 1 in.; Style 748 is similar to 738, but is not wire-inserted. All styles can be furnished with graphite coating.

•

Pressure Transmitter: The Hays Corp. (Michigan City, Ind.) has begun production of a new pressure transmitter that indicates low to medium pressures at point of measurement, transmits them electrically up to 300 ft. to an indicator. The transmitter measures direct and differential pressures of air and noncorrosive gases in inches of water ranging from 0 to 0.2 in. and 0 to 120 in.; static pressures up to 65 psig. The unit is easily converted from pressure to vacuum or to differential service in the field.

•

Miniature Valve: Circle Seal Products Co. Inc. (2181 East Foothill Boulevard, Pasadena, Calif.) is out with a new miniature, leakproof shutoff valve designed for use in either vacuum or pressure service. An "O" ring on the cylindrical face of the valve plug prevents leakage. Speedy repairs are possible without removing the valve from the line. Sizes: ⅛ and ¼ in.

•

Compact Canned Pump: A low-cost, extremely compact canned pump with a capacity of over 800 gal./hour is a new offering of Dynapump Division of Fosteria Corp. (Huntingdon Valley, Pa.). The new Model 420D is suitable for pressures to 150 psi. and temperatures to 220 F. It weighs 7 lbs., is available for operation on either 115- or 220-volt, single-phase, 50- or 60-cycle circuits.

•

Proportioning Probe: General Electric (Schenectady, N. Y.) is now producing a new proportioning probe, to be attached to its standard, low-cost H-6 halogen detector. The proportioner will differentiate the leak-caused halogen concentration from the "background" halogen content of a room already contaminated by leaked halogen. The probe is sold as an accessory, as well as in a kit containing the H-6 detector and necessary LS-20 leak standard.

•

Micro-Miniature Repair Tools: The Waltham Precision Instrument Co. (Waltham, Mass.) has just established a Small Tools Division that will now sell to industry micro-miniature cutting tools formerly utilized in its watch production. They are suited to the repair of instruments and control equipment where miniaturization is important. Typical of the diminutive sizes are taps which run as small as .012-in. diameter with 338 threads per inch. Among the other tools available: drills, broaches, countersinks, ides, face mills, keyway cutters, poising and circular saws.

•

Current Tester: The Hahn Co's. (2311 Fox Hills Dr., Los Angeles, Calif.) new pencil-size probe lights up when inserted into "live" outlets and switches, tests ac. and dc. from 110 to 550 volts.

•

Vertical Compressor: Joy Manufacturing Co. has added a new vertical, single-stage compressor to its line of heavy-duty air, gas-boosting and oil-free compressors. The new machine, WG-9H, has piston displacements from 633 to 1630 cfm., with maximum pressures to 125 psi. and horsepower ratings to 150.

•

Solids-Flow Controls: Two new devices, a feeder and a control valve, are available for controlling the feed of bulk materials.

The feeder, made by Fairfield Engineering Co. (Marion, O.), has an air-driven, variable-speed notched helix that prevents flooding and reduces the lumps in pulverized materials such as cement, lime and fly ash. An air-operated cutoff gate is adjustable for cutoff at any predetermined weight. The units have 9- and 14-in. outlets.

The control valve, made by Syntron Co. (Homer City, Pa.) has an aperture formed by a flexible diaphragm that opens and closes like the iris in a camera. Electric motor drive permits remote control of valves.

•

Proportioning Pump: A compact, pneumatically operated proportioning pump for pH control of process water is a new product of Proportioneers Div. of B-I-F Industries, Inc. (345 Harris Ave., Providence, R. I.). The pump is controlled by 3-15 psi. air pressure, will feed proper amount of water-treatment chemicals into process stream to overcome variations in water pH and flow rate.

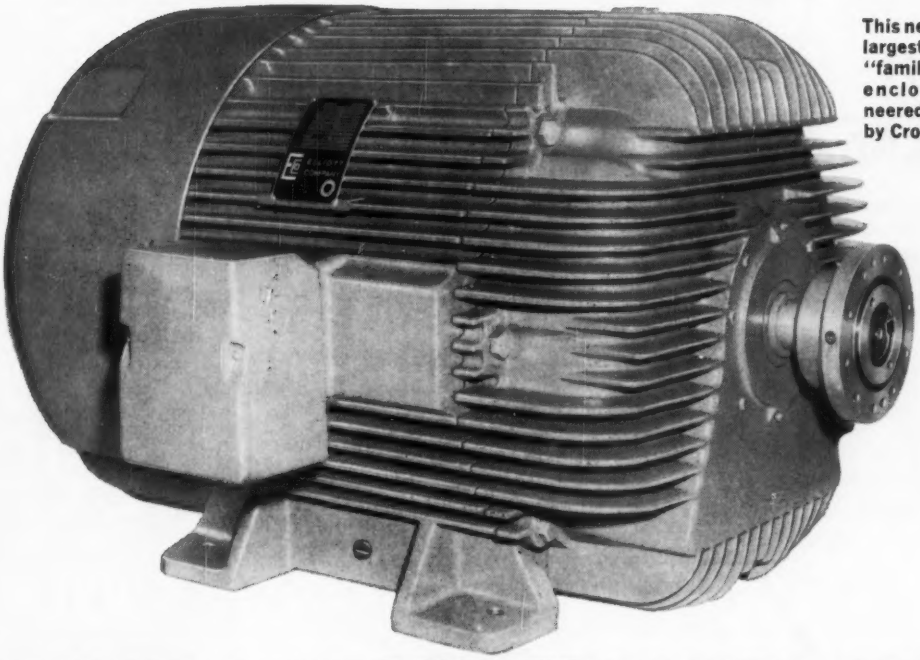
•

Disposable Safety Suit: Safety First Supply Co. (421 Magee St., Pittsburgh, Pa.) is out with a new polyvinyl chloride safety suit with a $3.95 price tag that makes it economically discardable after brief use. Suit is taped for tight closure at neck, wrists and ankles, will resist most acids, alkalis and fire.

•

Rapid-Flow Valve: Aerojet-General Corp.'s (Azusa, Calif.) new Silent Valve is said to eliminate aeration, cavitation, surging, vibration and noise, at the same time permit precise throttling of rapidly flowing fluids. Key: a cylindrical plug with a large number of axially aligned holes that is contained in a tubular housing between two perforated plates. The plug, made of an elastomer compatible with flowing fluid, is compressed mechanically or hydraulically by one of the perforated plates to close the holes in the plug.

BETTER COOLING MEANS LONGER LIFE LESS MAINTENANCE



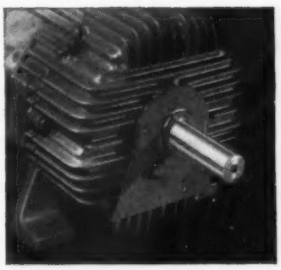
This new 300-hp unit is the largest of the Elliott C-W "family" of ribbed-frame enclosed motors, pioneered in the United States by Crocker-Wheeler.

ELLIOTT C-W SEALEDPOWER MOTORS

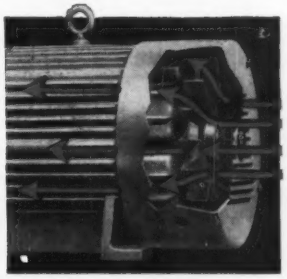
The numerous thin, deep ribs of Elliott C-W SEALEDPOWER Motors are the most advanced development of the ribbed construction, pioneered in the United States by Crocker-Wheeler. Modifications of SEALEDPOWER totally-enclosed fan-cooled motors include explosion-proof designs in all ratings up to 300 hp. Either open greasable or pre-lubricated bearings can be furnished.

Highly-effective sealing prevents entrance of moisture, dust, dirt, corrosive materials; consequently these motors can be depended upon for long, trouble-free service.

In numerous cases, SEALEDPOWER motors are proving to be more economical than standard open motors because of their low maintenance and dependability.



Extra fins keep bearing cool. This potential trouble spot is effectively cooled by the generous extra fins seen in the photograph above.



Cooling blast hugs frame. Air is directed along fins extending entire motor length. Easy to clean — no enclosed cooling passages to clog up.

Newest data on modern enclosed motors—including explosion-proof—is given in Elliott Bulletin PB 6000-2. Send for free copy today.

ELLIOTT Company

CROCKER-WHEELER PLANT JEANNETTE, PA.

FOR INDUSTRIAL FINISH FORMULATION

SHELL AROMATIC SOLVENTS

with a variety of evaporation rates

SHELL TOLUENE

. . . for applications where very fast evaporation and high solvency are required.

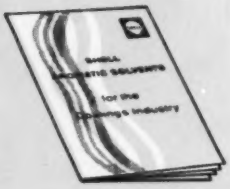
SHELL XYLENE

. . . has an exceptionally narrow distillation range, is slower drying than toluene.

SHELL CYCLO-SOL* 53

. . . an excellent solvent with higher flash point and slower evaporation rate than xylene. Recommended for baking finishes and flow coating.

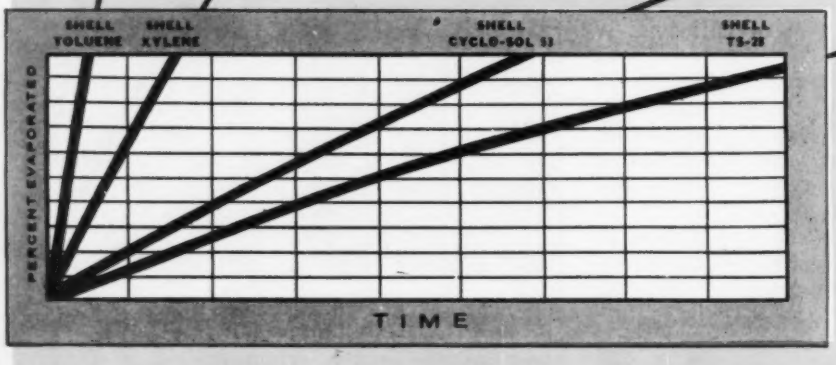
*Registered Trademark



Typical properties are given in the booklet shown. Write for a copy.

SHELL TS-28 SOLVENT

. . . a still slower drying aromatic concentrate of medium high solvency. Recommended for baking finishes and flow coating.



These Shell solvents cover a very wide range of evaporation rates. Their individual characteristics satisfy specific requirements in a great variety of formulations.

SHELL OIL COMPANY

50 WEST 50TH STREET, NEW YORK 20, NEW YORK
100 BUSH STREET, SAN FRANCISCO 6, CALIFORNIA

SHELL

Technology
Newsletter

CHEMICAL WEEK
January 23, 1960

A photosensitive plastic-printing-plate process will go commercial in a new unit to be built at Du Pont's Parlin, N. J., plant. Initial capacity: 1 million sq. ft./year of plates, called Dycril photopolymer printing plates. They have been in field trial since '57, but Du Pont has yet to reveal the plastic material involved. Reason: competition—Time Inc. has been working on a similar development.

Du Pont has been researching the more-than-$6-million project since '49, will say only that the plate has a thin layer of plastic monomer bonded to a metal support. The plate is covered by a high-contrast photographic negative of the matter to be reproduced in print. On exposure to ultraviolet light (e.g., a carbon arc), the plastic polymerizes, hardens in the exposed areas. The unexposed, soft areas under the negative are washed away with a pressurized water spray containing less than 1% sodium hydroxide. A plate, ready for a press run, can be made from a negative in 15-20 minutes.

•

Newest direct heat-to-power converter is a high-temperature cesium cell unveiled last week by General Dynamics Corp.'s General Atomic Division. Unique property of the cell: its ability to generate alternating current. Other types of thermoelectric converters *(CW Technology Newsletter, Nov. 28, '59)* produce direct current, which would have to be converted to alternating current for efficient, long-distance transmission.

Operation of the cesium cell is based on the Edison effect—the principle employed in vacuum tubes. It uses a hot metal plate from which electrons are boiled off at white-hot temperatures, and a cold plate, which collects the resulting electron stream. Cesium boosts the rate at which electrons boil off the hot plate, reduces energy losses at the cold plate and improves current flow by creating a plasma to neutralize the electron space charge between electrodes. Frequency of the alternating-current output is about 100 kilocycles/second.

•

Intensified efforts to tap the Athabasca oil sands were disclosed last week by a newly formed four-company partnership. The participants: Imperial Oil Ltd., Cities Service Athabasca, Inc., Richfield Oil Corp. and Royalite Oil Co., Ltd.

Nucleus of the stepped-up program is a $3.5-million pilot plant that Cities Service put onstream last August as part of a two-year-old research project at Mildred Lake, in northern Alberta.

A new oil extraction process to be tested in the Mildred Lake area has been adapted to a portable, self-propelled unit, which will accompany a specially designed, German-built strip-mining machine as it works its way through the oil-sands deposits.

The basic extraction of the sands' bitumen content starts with the addition of a diluent (derived from the product) to reduce viscosity and specific gravity. Water is then added to precipitate the sand, which is discharged into the mined-out area, and to carry the diluted bitumen into a separation unit from which water can be recovered for recycle.

Diluent is recovered by flash distillation in a 3,000-bbls./day recovery unit. Virgin bitumen is split into two streams—one going to fuel storage, the other to a visbreaking (thermal cracking) unit. Products: diluent, overhead naphtha, bitumen and visbreaker liquid.

Pending the outcome of pilot extraction tests, the Athabasca group is concentrating on experimental hydrogenation techniques that will be required to convert the high-viscosity, high-sulfur bitumen (75 API gravity, 5% sulfur) into a salable low-sulfur crude.

•

In the cards for American cars: central hydraulic systems that run a range of equipment—automatic transmission, windshield wipers, etc. Fluids under consideration include both synthetics and petroleum-bases.

Two technical committees of the Society of Automotive Engineers drew up tentative specifications for these fluids, got preliminary approval at last week's annual SAE meeting in Detroit.

The only auto now using such a system is the Citroen DS19, which runs power brakes, power steering, suspension and automatic clutch on a heavy-duty synthetic fluid that meets current SAE Spec. 70R1.

Ford Motor Co. is doing most work on this in the U.S., may have a system using a petroleum-base fluid on the '62 models of Lincoln and Thunderbird.

•

Vapor-transmitting, water-repellent plastic film developed by Electric Storage Battery for use as a battery separator is looking for new uses. A new company, E.S.B.-Reeves, Inc. (Glenside, Pa.), will push for applications in protective clothing, bandages, filters, etc.

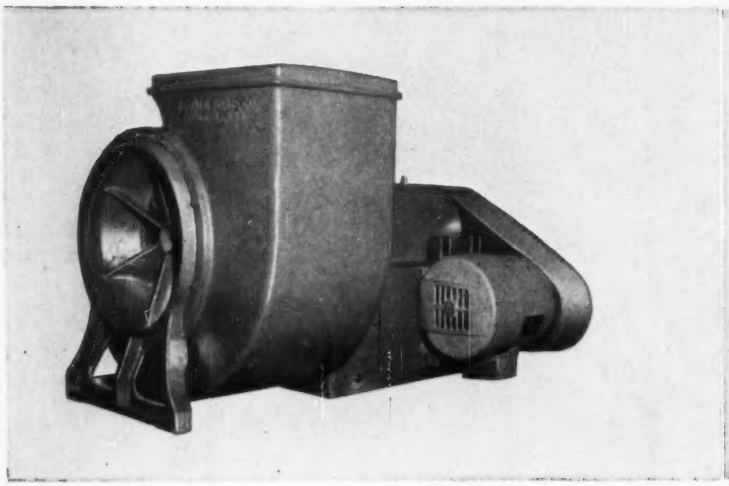
The film (vinyl or polyethylene) is made by blending resin with starch, boiling in water to swell the starch particles, then hydrolizing the starch in sulfuric acid to leave tiny, interconnected holes. While its most promising new application is in rainwear, problems in drycleaning have cropped up and will get further study.

•

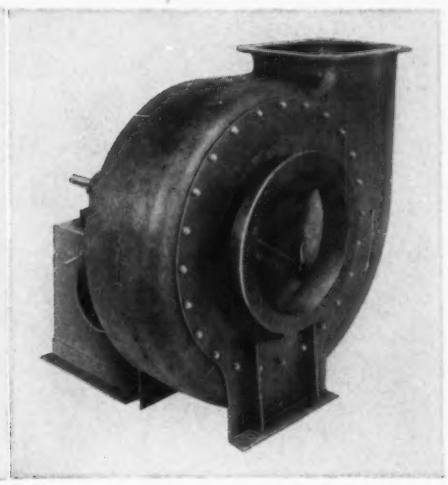
Latest word on the Soviets' plastic semiconductors *(CW Technology Newsletter, Jan. 2)* indicates that the trick to making organic polymers conductive lies in high dosages of ionizing radiation. A dosage of up to 4.5 million roentgens was used to make polyacrylonitrile as conductive as germanium or silicon. The Russian scientists are now working on a new material composed of polyacrylonitrile combined with silicon.

CORROSIVE FUMES?

HANDLE THEM WITH THESE SPECIAL "BUFFALO" FANS



"Buffalo" Cast Iron Exhauster



"Buffalo" Fiber Glass Fume Fan

"Buffalo" Cast Iron Exhausters are built to withstand extreme corrosive conditions in the chemical process industries. High efficiency is the result of low-turbulence air flow design. This includes heavy-duty cast iron housings and cast inlet cones with integral inlet vanes. Non-overloading characteristics are preserved despite changes in system pressure. Available with direct motor drive, separate belt drive or package unit with adjustable pitch V-belt drive and motor mounted on adjustable base rails. Write us for full information.

"Buffalo" Resin-Bonded Fiber Glass Fume Fans are highly resistant to such chemical corrosives as acids, salts, gases, organic materials and others. They are suitable for temperature applications up to 300° F. The fan housing is constructed entirely of fiber glass. All exposed parts of the factory-balanced rotor are encased in thick fiber glass. Standard capacities range up to 34,000 cfm at pressures to 10″ static. Investigate the advantages of "Buffalo" Type "FG" Fume Fans—versatility, lighter weight, reasonable cost, dependability. Write for Bulletin FI-511.

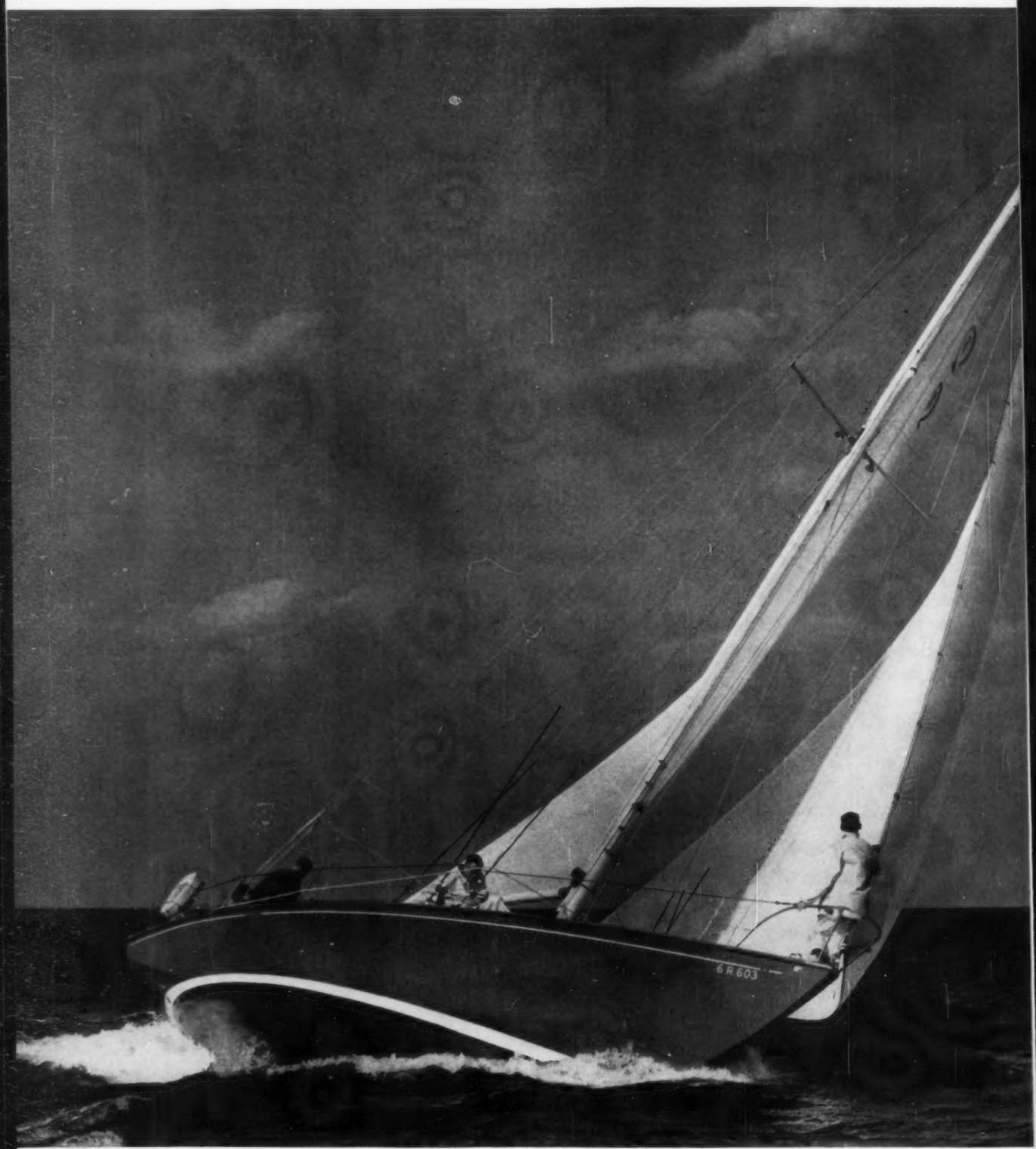
These two specialized fans are representative of the air handling units engineered by the Buffalo Forge Company to help you combat the corrosive fumes encountered in many industrial processes. In addition to these fans, "Buffalo" offers rubber lined fans, fans with other special coatings and a comprehensive line of air cleaning units.

For complete details on "Buffalo" corrosive fume handling units, contact your "Buffalo" engineering representative or write us direct.

BUFFALO FORGE COMPANY
BUFFALO, NEW YORK
Buffalo Pumps Division, Buffalo, N. Y.
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

VENTILATING • AIR CLEANING • AIR TEMPERING • INDUCED DRAFT • EXHAUSTING • FORCED DRAFT • COOLING • HEATING • PRESSURE BLOWING

MARKETS



Bounty II—41-ft.-long ocean racer sloop made of glass-reinforced plastic-dramatizes big boat market

ROSENFELD

for plastics.

Plastic Pleasure Boats —a Joy to Resin Makers

The '60 National Motor Boat Show, in full swing at New York's Coliseum, proves a point to the favor of the U.S. chemical industry—modern plastics are rapidly revolutionizing the U.S. pleasure boat business. This year an estimated 150,000 plastic boats will be built, nearly 40% of new U.S. boats.

About 130,000 reinforced-plastic pleasure boats were made in '59. Production in '58: about 85,000.

Plastic boats are expected to crest at about 60% of the market—some think 80%—in the next few years, with output hitting 300,000 units. Meanwhile, the boat market will be growing, and other types of boats will share in it.

Payloads for CPI: To the CPI, the boat boom spells big business in many ways, especially in sales of polyester resins used in glass-reinforced plastics. About 75 million lbs. of reinforced plastics (including glass fiber, resins, pigments, fillers, etc.) were reportedly used in boats in '59; 36.9 million lbs. were used in '58. Another industry estimate puts polyester resin consumption (excluding glass) at 40 million lbs./year now, 90 million lbs. in '65.

But success of glass-reinforced polyester boats was largely responsible for a cutback in plywood consumption in pleasure boat manufacture—which, in turn, reduced the demand for plywood adhesives. About 171 million sq. ft. of plywood were used in '58, 165 million in '59.

Aluminum, on the other hand, has also been gaining as a boat construction material, won a 50-million-lbs. boat market in '59, up from the 47 million lbs. required in '58.

Also benefiting from gains made in boat construction are, of course, a host of other chemical products ranging from essential supplies, such as marine paints and varnishes (12 million gal. in '59), to a plethora of less essential but attractive boating gadgets.

Epoxies Buck Headwinds: Early last year epoxy resin boosters predicted that epoxies would soon give polyester resins a run for the boat market dollar (*CW, Feb. 14, '59, p. 75*). But now, a year later, polyesters are skimming along under full sail, while epoxies are still trying to push off the dock.

Critics of epoxies (as boat construction materials) repeatedly point to disadvantages such as more complex processing, slower curing times, higher cost. Others attribute the limited use of epoxy resins in boat manufacture partly to the tendency of some curing agents to cause skin irritation on contact.*

But these knocks by competitors don't faze epoxy boosters. They say these one-time limitations have been solved. Their rebuttal: spray techniques have simplified production problems, and price isn't actually a handicap, because less epoxy than polyester is needed to make a comparable boat.

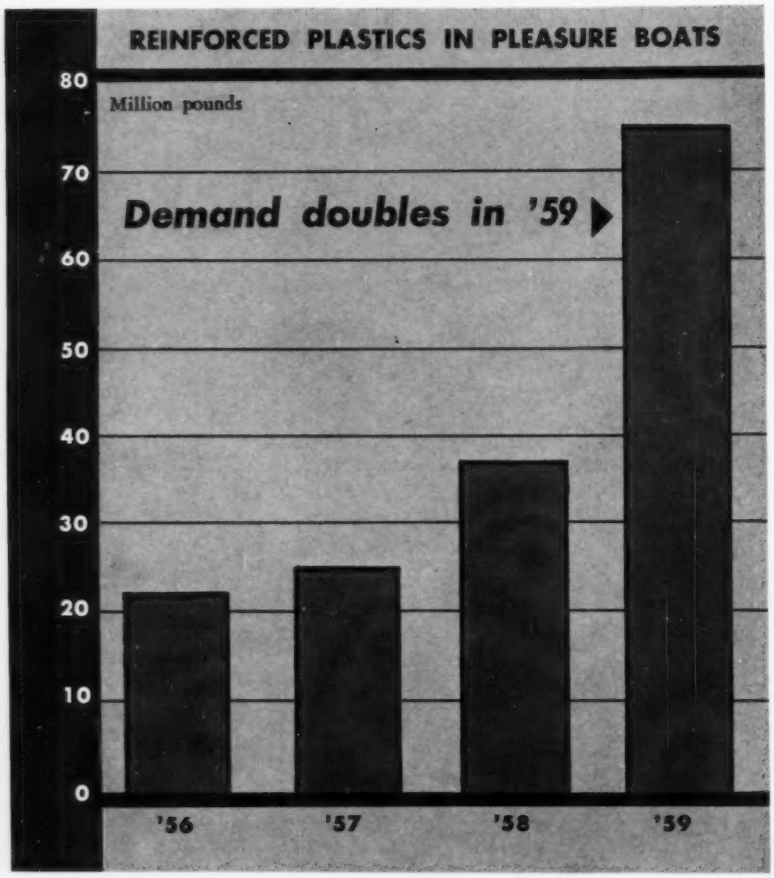
Epoxy enthusiasts bemoan the lethargy of boat makers, say they can't seem to recognize that the buying public would welcome lightweight epoxy boats if only they were made available.

But whether the fault is that of manufacturers or the buying public, it's obvious that epoxy boats haven't yet taken hold. Best estimate of epoxies' share of the reinforced-plastic boat market is about 2%, with polyesters holding on to 98% of the market. One boat maker who puts out both epoxy and polyester-type craft admits that earlier optimism has been dampened by slow movement of epoxy boats—with one exception: canoes.

Competition Coming? Despite the polyesters' big lead—which they will undoubtedly hold for a long time—other types of plastics aren't to be counted out. The Society of the Plastics Industry backs this view, predicts that other plastics will nab at least 5% more of polyesters' market share by '65. Expected to have more of the market, says SPI, are epoxies and phenolics.

SPI also points out that use of glass as reinforcing material—although due to increase in total poundage—will slip to an estimated 85% share of the boat market in '65 compared with 92% now.

*See "Marine Design Manual for Fiberglass-Reinforced Plastics," published this month by McGraw-Hill.



Glass Bottlenecks: Likely, plastic boat production in '60 will be hampered by shortages of reinforced plastics. The trouble doesn't lie in resin supplies—which CPI producers say are plentiful—but rather in a shortage of glass-fiber reinforcement.

The glass pinch plagued the reinforced-plastics industry through much of '59. A spokesman for the glass industry now explains that the shortage was created by demands that overtaxed production facilities. He adds, "We could have sold twice as much glass fiber last year, had we been able to make it."

There's relief in sight—but not immediately. Virtually all glass producers are speeding expansions in one manner or another. However, a significant supply boost won't be seen until at least the second half of this year; in fact, some observers express doubt that the problem will be solved before '61.

Sails Go Synthetic: Penetration of synthetic fabrics in the sail market is virtually complete—only a small part of total U.S. sail output now involves cotton. One sail maker says that for every cotton sail, he makes 300 synthetic ones.

Du Pont's Dacron has billowed into the forefront of this market with 400,000 lbs. going into sails in '59, plus about 75,000 lbs. of nylon-6,6. Total U.S. '59 nylon sales for sail making are estimated at 100,000 lbs.

This totals 500,000 lbs. of synthetic fabrics used in '59—five times the total market of 100,000 lbs. in '51, when most sails were made of cotton and synthetics were just beginning to penetrate the market.

Cordage Stretch: In marine cordage, nylon is the most important synthetic fiber used. Du Pont says it sold 3.2 million lbs. of nylon for this in '59, took an estimated 80% of this nylon market. Du Pont says its nylon sales for this use was 1.6 million lbs. in '57.

About 500,000 lbs. of Dacron fiber went into cordage in '59—compared with 154,000 lbs. in '57.

Unlike the sail market, synthetic cordage hasn't yet taken over the major part of the business; Manila rope is still fighting hard for its traditional business. Nonetheless, synthetic fiber makers expect to take about 50% of the total U.S. marine cordage market in the next five years.

Meanwhile, a new competitive situation is shaping up within the synthetic cordage business itself. Polypropylene and polyethylene ropes are coming in, but it's still too early to predict their impact.

How much synthetic cordage goes into pleasure craft use or how much into heavy ships (commercial, naval) is hard to estimate because cordage manufacturers don't list outlets. However, Du Pont figures that of the 3.7 million lbs. of synthetic fibers it sold in '59 for cordage, roughly 1.5 million went into the pleasure boat market, 2.2 million into heavy-ship applications.

Foam Flotilla: Foamed plastics are also cashing in on the boat market—in both pleasure boat and commercial/defense applications. Foamed polystyrene is now biggest in these applications, but polyurethanes are coming in fast.

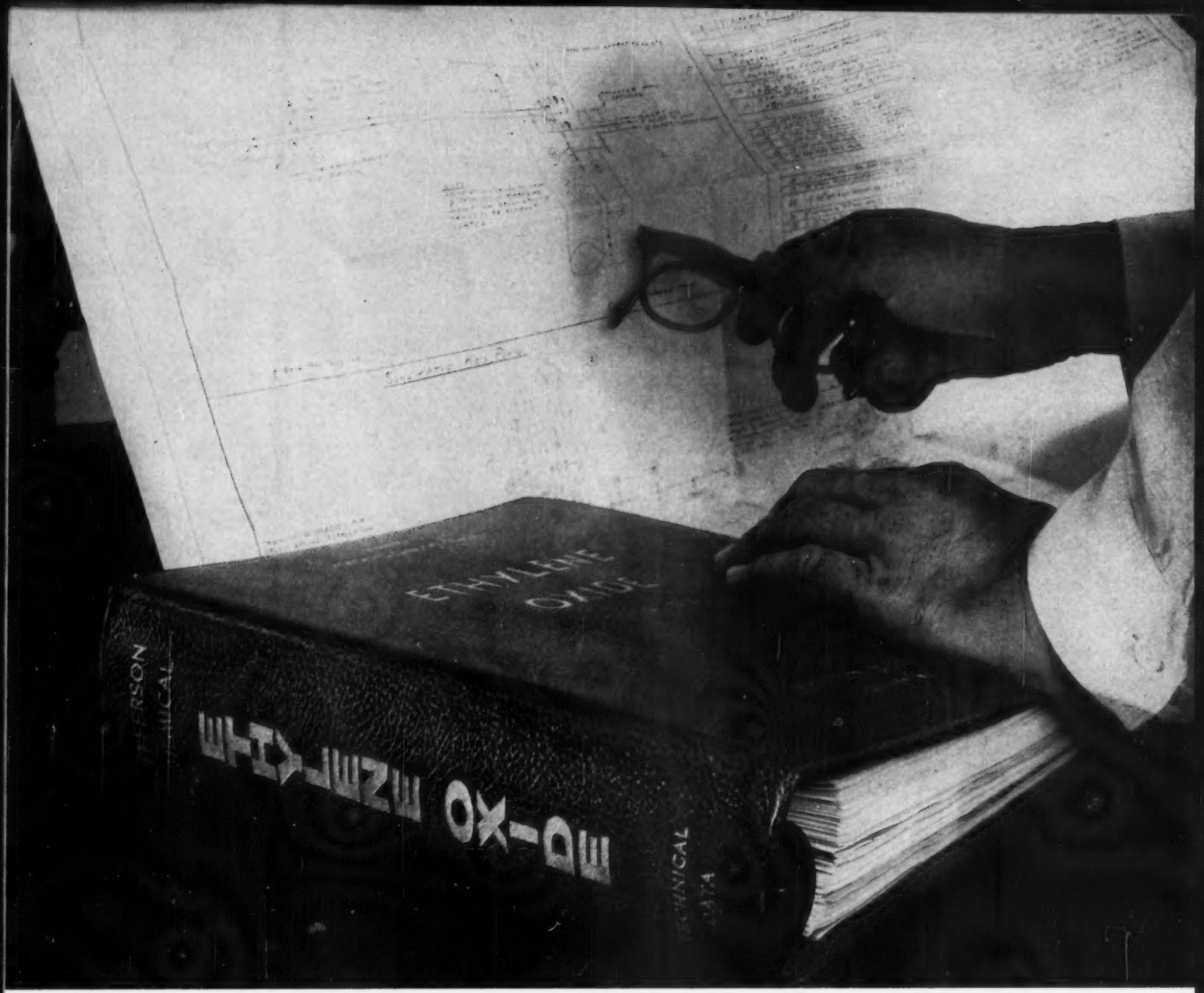
Depending on how the foams are used, they provide several advantages, including increased buoyancy, insulation, shock and noise absorption.

Pleasure boat makers have undoubtedly been encouraged to use foams in their products by the tacit endorsement of these products by the U.S. Navy and commercial boat firms. For example, the Navy used polyurethane foams as void filler in construction of atomic submarines.

Polyurethane foam is also now considered for use in the government's experimental Liberty ships, and is already widely used in lifeboats, refrigerator ships, methane carriers, etc.

How big is the boat foam market? Most experts frankly admit they haven't the faintest idea now. Reason: the market is still too new, has developed too rapidly to permit proper evaluation.

One thing is certain: foams—along with reinforced plastics and other CPI-produced products—are headed for steadily expanding marine applications because there's little doubt about what direction the boat boom is swinging.



Jefferson backs the industry's best ethylene oxide with a wealth of technical data and services

As a result of new production facilities and techniques employed in 1959, Jefferson was able to announce "the tightest ethylene oxide specifications in the industry." Among the benefits that customers may expect with this higher quality ethylene oxide are: less water, lower aldehyde contents, lowered acidity, less non-volatile residue, lower chlorides, and nil acetylene.

Jefferson augments this new improved ethylene oxide with comprehensive technical data and technical application services. The Jefferson engineers' three-inch manual pictured above contains indexed information on Properties, Toxicity, Safety, Storage and Equipment, Containers, and Reactions of ethylene oxide. This manual is not available for distribution, but you may obtain any part of the information it contains from the Jefferson engineers. For example, if you are setting up to store and handle ethylene oxide, they can give you cost estimates, blueprints of typical facilities, recommended equipment and procedures. They can be equally helpful in the numerous uses of ethylene oxide.

Still another highly useful survey is Jefferson's literature and patent abstract . . . "The Preparation of Non-ionic and Other Surface Active Agents Based on Ethylene Oxide." This survey is available to those engaged in industrial research.

Write us a line on your company letterhead stating your exact interests in ethylene oxide. Whether they be in technical literature, samples of this new oxide, or a personal consultation, you'll find Jefferson offers *complete* ethylene oxide services . . . Jefferson Chemical Company, Inc., 1121 Walker Avenue, P. O. Box 303, Houston 1, Texas.

Ethylene and Propylene Oxides, Glycols, Dichlorides, Carbonates • Ethanolamines
SURFONIC® Surface-Active Agents • Polyethylene and Polypropylene Glycols • Morpholine
N-Alkyl Morpholines • Piperazine • Piperazine Salts • Nonyl Phenol • Caustic Soda
HOUSTON • NEW YORK • CHICAGO • CLEVELAND • CHARLOTTE • LOS ANGELES

JEFFERSON CHEMICALS

TC
TENNESSEE CORPORATION

LIQUID

SULFUR DIOXIDE

Particularly recommended for its properties as a reducing agent, preservative, antichlor and pH control.

Tennessee's Liquid Sulfur Dioxide is a product of highest purity.

This versatile chemical of so many uses can be very efficiently and economically used in various production processes. Tennessee's Liquid Sulfur Dioxide can perhaps be utilized to advantage in your processing.

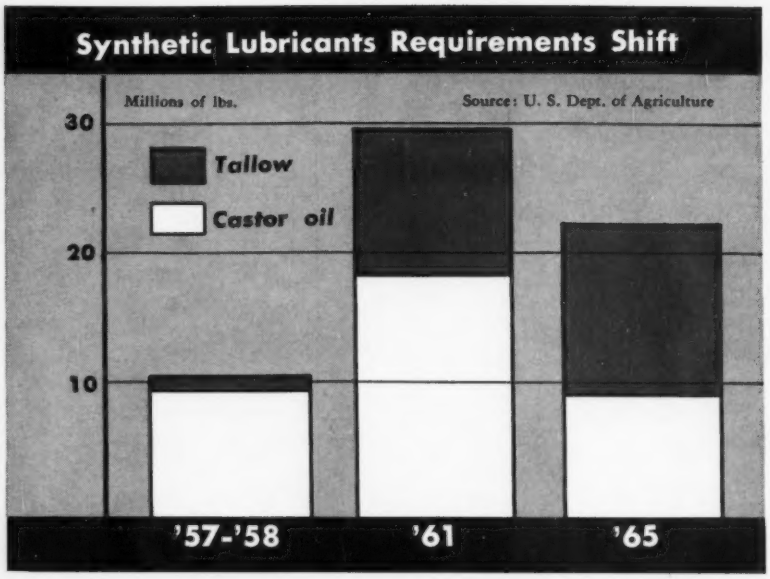
We would like to discuss with you the possibilities of Tennessee's Liquid Sulfur Dioxide in your processing.

LIQUID SULFUR DIOXIDE HIGHEST QUALITY SO_2

Available in:
- CYLINDERS
- TON DRUMS
- TANK TRUCKS
- TANK CARS

TC TENNESSEE CORPORATION

TENNESSEE CORPORATION
615-629 GRANT BUILDING
ATLANTA 3, GEORGIA



Time to Change Oil?

As the market for synthetic lubricants swells, the demand for tallow will increase 12 million lbs./year by '65, cut into the market for castor oil. These estimates are part of a market report just published by the Dept. of Agriculture.*

Synthetic lubricants now have an important part in aviation, for use in turboprop and turbojet aircraft, which require special products that can perform under extreme temperature conditions. Conventional petroleum products do not stand up at the higher operating temperatures for these new engines.

So far, a derivative of castor oil (di-2-ethylhexyl sebacate) has dominated the synthetic lubes market. But, the report points out, azelaic acid (derived from tallow) is a low-priced contender for this market, since tallow is now in oversupply and cheaper than castor oil.

New Outlets Open Up: Military aircraft makes up the largest market for synthetic lubes. But with the introduction of turboprop and turbojet passenger aircraft, commercial use of the lubes will increase.

USDA estimates needs of the military in '61-'65 at about 25 million lbs./year. Meanwhile, civilian aircraft consumption will move up to 9 million lbs. by '61 to 13 million lbs./year by '65. The total aircraft market for '65: 38 million lbs.

Another potential market expected to shape up by '65 is based on the development of turbine engines for automobiles. Although any projections are now highly speculative, USDA's report indicates that this development could mean additional sales of 4 to 36 million lbs. of synthetic lubes annually. Based upon sales to the aircraft industry, plus 4 million lbs. going to the auto market in '65, the following projections of the market for azelates and sebacates was made:

Demand for sebacate lubricants, which averaged 8.8 million lbs./year in '57-'58 (4.4 million lbs. of sebacic acid), is estimated to grow to 16.7 million lbs. next year (8.4 million lbs. of sebacic) then drop to 8.4 million lbs. (4.2 million lbs. of sebacic) in '65. During this period, the sebacates' share of the market will drop, from 95% in '57-'58, to 64% in '61, 40% in '65.

At the same time, use of lower-priced azelate lubricants is expected to jump from 300,000 lbs./year (120,000 lbs. of azelaic acid) in '57-'58 to 7.4 million lbs. (nearly 3 million lbs. of azelaic) in '65, increase its share of the market from 3% to 45%.

*"Market Potential for Fats and Oils in Synthetic Lubricants," AMS-353, available from the Agricultural Marketing Service, U.S. Dept. of Agriculture, Washington, D. C.

Special Introductory Offer

(GOOD FOR LIMITED TIME ONLY)

To new members of the CHEMICAL ENGINEER'S Book Club

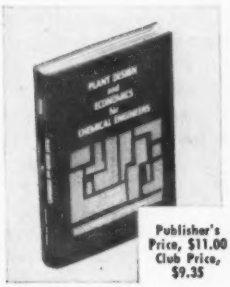
ANY ONE FOR ONLY $1.00

WITH YOUR FIRST SELECTION AND CHARTER MEMBERSHIP

VALUES FROM $9.50 TO $13.50

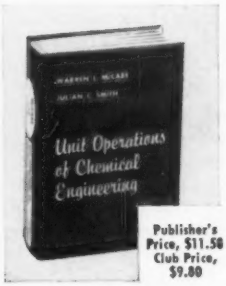
Publisher's Price, $10.00 Club Price, $8.50

The Properties of Gases and Liquids by R. C. Reid and T. K. Sherwood. How to estimate and correlate the properties of gases and liquids.



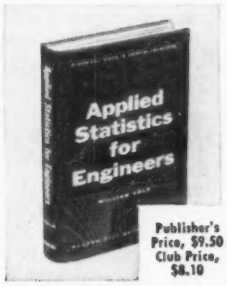
Publisher's Price, $11.00 Club Price, $9.35

Plant Design and Economics for Chemical Engineers by M. S. Peters. How to plan and set up effective manufacturing operations.



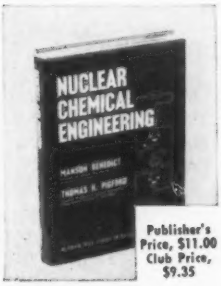
Publisher's Price, $11.50 Club Price, $9.80

Unit Operations of Chemical Engineering by W. L. McCabe and J. C. Smith. Describes fundamentals and equipment of unit operations.



Publisher's Price, $9.50 Club Price, $8.10

Applied Statistics for Engineers by William Volk. Helps you analyze processing, research, and other kinds of industrial data.

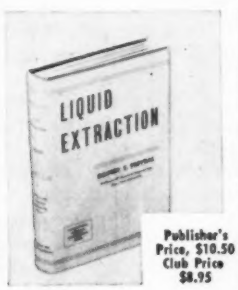


Publisher's Price, $11.00 Club Price, $9.35

Nuclear Chemical Engineering by M. Benedict and T. H. Pigford. Gives you essential knowledge required in today's nuclear technology.

Publisher's Price, $11.00 Club Price, $9.35

Pilot Plants, Models, and Scale-up Methods in Chemical Engineering by R. Johnstone and M. Thring. How to plan small-scale chemical plant studies.

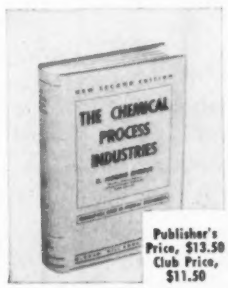


Publisher's Price, $10.50 Club Price $8.95

Liquid Extraction by R. E. Treybal. Complete review and organization of all phases of the unit operation of liquid-liquid extraction.

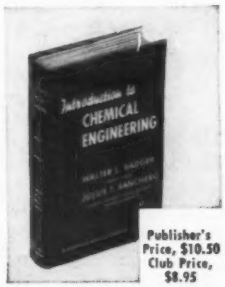
Publisher's Price, $11.00 Club Price, $9.35

Mass-Transfer Operations by R. E. Treybal. Explains diffusion and techniques used in industrial applications of mass-transfer operations.



Publisher's Price, $13.50 Club Price, $11.50

The Chemical Process Industries by R. N. Shreve. Second Edition. Gives you a clear picture of the various chemical process industries.



Publisher's Price, $10.50 Club Price, $8.95

Introduction to Chemical Engineering by W. Badger and J. Banchero. Covers practical aspects of engineering and equipment for the unit operations.

How many of the books shown here do you wish you had immediately at hand?

Select one for JUST A DOLLAR! Choose from *Nuclear Chemical Engineering, Liquid Extraction, Chemical Process Industries,* and seven other valuable books . . . your introduction to membership in the *Chemical Engineers' Book Club.*

If you're missing out on important technical literature—if today's high cost of reading curbs the growth of your library—here's the solution to your problem. *The Chemical Engineers' Book Club was organized for you,* to provide an economical technical reading program that cannot fail to be of value to you.

All books are chosen by qualified editors and consultants. Their thoroughgoing understanding of the standards and values of the literature in your field guarantees the authoritativeness of the selections.

How the Club operates. Every second month you receive free of charge *The Chemical Engineers' Book Club Bulletin* (issued six times a year). This gives complete advance notice of the next main selection, as well as a number of alternate selections. If you want the main selection you do nothing; the book will be mailed to you. If you want an alternate selection . . . or if you want no book at all for that two-month period . . . notify the Club by returning the form in the envelope enclosed with your *Bulletin.*

We ask you to agree only to the purchase of three books in a year. Certainly out of the large number of books in your field offered in any twelve months there will be at least three you would buy anyway. By joining the Club you save yourself the bother of searching and shopping, and save in cost about 15 per cent from publishers' prices.

Send no money now. Just check any two books you want—one for only $1.00 and one as your first Club selection—in the coupon below. Take advantage of this offer *now,* and get two books for less than the regular price of one.

THIS COUPON IS WORTH UP TO $12.50

The Chemical Engineers' Book Club, Dept. CW-1-23
330 West 42nd Street, New York 36, N. Y.

Please enroll me as a member of the Chemical Engineers' Book Club. I am to receive the two books I have indicated at the right. You will bill me for my first selection at the special club price and $1 for my new-membership book, plus a few additional cents for delivery costs. (The Club assumes this charge on prepaid orders.) Forthcoming selections will be described to me in advance and I may decline any book. I need take only 3 selections or alternates in 12 months of membership. **(This offer good in U. S. only)**

PLEASE PRINT

Name .....

Address .....

City ..... Zone.... State.....

Company .....

NO RISK GUARANTEE If not completely satisfied I may return my first shipment within 10 days and my membership will be canceled.

Check 2 Books: #1 for dollar book and #2 for Club selection

- ☐ Prop. of Gases & Liquids, $8.50
- ☐ Plant Design & Economics for Chemical Engineers, $9.35
- ☐ Unit Oper. of Chem. Engg., $9.80
- ☐ Applied Statistics for Engrs. $8.10
- ☐ Nuc. Chem. Engg., $9.35
- ☐ Pilot Plants, Models & Scale-up Meth. in Chem. Engg., $9.35
- ☐ Liquid Extraction, $8.95
- ☐ Mass-Transfer Operations, $9.35
- ☐ Chem. Process Industries, $11.50
- ☐ Intro. to Chem. Engg., $8.95

CW-1-23

THE LITHIUM REACTOR

PERTINENT INFORMATION ON LITHIUM CHEMISTRY AND METALLURGY

Completion of AEC Contract Frees New Technical Li_2CO_3 Source

LCA to pack in 50-lb bags. First to adopt this packaging for lithium chemicals

Completion of its contract to supply lithium hydroxide to the Atomic Energy Commission frees Lithium Corporation of America to offer lithium carbonate, technical, in sufficient quantity to meet all commercial demands.

For greater convenience in handling and storage, this carbonate will be packed in specially developed white 50-lb bags having bright red labels for easy product identification. LCA, which also packs lithium hydroxide in 50-lb bags, is the first producer of such products to use this extremely convenient form of packaging.

Typical analysis of the new LCA material shows 99.2% Li_2CO_3. It is offered at prices which are competitive with the currently available technical grades.

Recently completed materials handling studies showed that the use of bags will also result in savings for the purchaser. This comprehensive study by a lithium customer showed that transportation, handling and storage costs were appreciably lower when bags are used as contrasted to other forms of packaging. However, for those whose operations are geared to drums, LCA also provides the material in 325-lb fiber drums.

LITHIUM CORPORATION OF AMERICA ACQUIRES FULTON-IRGON

The Fulton-Irgon Corporation, pioneer in propellants and rockets, was acquired recently by Lithium Corporation of America. This purchase will provide LCA with research and production abilities in the broad field of missiles, rockets and advanced aircraft systems. Continuing operation as the Fulton-Irgon Division, the new acquisition will enable LCA to provide better service to its present and potential customers since lithium chemicals and lithium alloys are already under active consideration in this field.

Bibliography On Lithium Available

The 6th supplement of the "Annotated Bibliography on the Use of Organolithium Compounds in Organic Synthesis" has just been published by Lithium Corporation of America.

This publication contains 328 references with subject and author indexes. Copies of the book ($2.00 each) can be ordered from the Sales Service Department.

LITHIUM IN BRIEF

New developments involving lithium are constantly appearing in the literature. Each month some will be mentioned briefly here.

A report on the use of butyllithium and ethyllithium catalysts to initiate the polymerization of isoprene in various solvents has been published. (C.W. 1).

Lithium-dependent catalysts are also used to copolymerize isoprene-styrene mixtures. (C.W. 2).

Lithium carbonate, aluminum oxide, silicon dioxide and clay are used to prepare a new ceramic material highly resistant to thermal shock. (C.W. 3).

ANNOUNCEMENT

The uses of lithium in chemistry and metallurgy are expanding at a rapid rate. To bring you the news of the latest developments, Lithium Corporation of America will publish a new series of technical news bulletins of which this is the first. Additional copies of the LITHIUM REACTOR will be supplied regularly by mail to readers upon request.

For additional information on the items appearing in the LITHIUM REACTOR, address inquiries to: LITHIUM CORPORATION OF AMERICA, INC., Sales Service Department, Title Insurance Building, Minneapolis 1, Minn.

Lithium carbonate has had its greatest use in the ceramic, glass and chemical manufacturing fields. Manufacturers of special glasses find it a valuable chemical in aiding them in meeting exacting specifications. In making glass of high chemical resistance, lithium carbonate replaces other alkali carbonates in whole or part, as a flux, keeping alkali bulk to a minimum. This decreases the expansion coefficient and increases the acid resistance of the glass. The value of lithium carbonate as a flux results from the small radius of the lithium ion as well as its low atomic weight. In many cases this compound is finding applications in the production of finer and more specialized glasses.

LITHIUM CORPORATION OF AMERICA BUILDING NEW LABORATORIES AT BESSEMER CITY

LCA's Bessemer City plant where centralized research facilities for the company are under construction. The new laboratories, expected to be completed early next summer, will house greatly expanded facilities and staff.

LITHIUM CORPORATION OF AMERICA, INC.

SALES SERVICE DEPARTMENT • TITLE INSURANCE BUILDING • MINNEAPOLIS 1, MINN.

NEW YORK 17, N. Y. • CLEVELAND 14, OHIO • CHICAGO, 1, ILL. • LOS ANGELES 36, CALIF. • BESSEMER CITY, N.C.

Market Newsletter

CHEMICAL WEEK
January 23, 1960

Will prices of high-density polyethylene be reduced? It's a distinct possibility, with increasing behind-the-scenes pressuring of producers by big-volume buyers.

One stimulus to the price haggling comes from recent reduction of tabs on low- and medium-density polyethylenes, initiated last month by Union Carbide Plastics (*CW Market Newsletter, Dec. 26, '59*). Producers argue that high-density material isn't basically competitive with low- and medium-density polyethylenes. There's still confusion, however, in the trade in differentiating one type from another, and pricing discussions become complicated.

At least one major buyer of high-density polyethylene has, according to trade reports, gone so far as to threaten setting up its own facilities for high-density PE. But impact of such rumored threats are softened by the belief that most consumers don't have the technical know-how to plunge into PE manufacture.

Meanwhile producers of high-density polyethylene are resisting a price cut, say their backs are to the profit wall.

•

Consumers of polystyrene sheet are getting a price break. A major price reduction—averaging about 12%—has been posted by Plax Corp. on its biaxially oriented polystyrene sheet (Polyflex 100). Reason for the cut: "increased volume of business, improved manufacturing techniques."

One example: 0.010-gauge sheet is reduced 11¢/lb. to 57¢/lb. A price comparison with competitive materials, says Plax, shows the new prices put polystyrene sheet costs 30-40% below those of other clear plastic sheet materials.

•

Competitive pressure on U.S. pyridine producers is eased by a slackening of pyridine imports. U.S. producers are unable to definitely explain the lower imports, but suggest that a tighter supply/demand balance abroad may be partly responsible. The view is substantiated by increasing requests for U.S. pyridine by foreign buyers. Another factor may have been a stock buildup by a host of consumers who moved to strengthen their supply situations in early '59 in anticipation of expected steel strike-caused shortages.

Meanwhile Reilly Tar & Chemical assures its customers that pyridine prices will likely remain firm at levels established by an earlier 5¢/lb. cut on synthetic material (*CW Market Newsletter, June 27, '59*). If some increases become necessary later, it's added, they would in any case be modest, create no hardships.

A spate of price cuts by British companies reflects growing concern over rising imports and competition from the European "Common Market."

Newest price changes by Imperial Chemical Industries include 1-10% reductions on methylene chloride, methyl chloride, sodium persalts, urea, methanol, Cereclor plasticizer. These cuts—together with others made in December—will save customers about $5.6 million/year, according to ICI.

Meanwhile, Shell Chemical has cut cost of propylene oxide $28/ton, various grades of polyethylene glycol by $22-30/ton. Other reductions involve melamine (British Oxygen Chemicals), industrial alcohol (Distillers Co.), polyethylene glycol (Union Carbide Ltd.), styrene monomer ($14/long ton by Forth Chemicals).

•

Hopes that 10-mil-thick polyethylene bags might replace multiwalls are fading. Reason: PE is too expensive to compete effectively against paper bags. But some think there may be a way out—if production problems can be licked. New hopes are pinned on a polyethylene-rubber bag (using 6-mil PE 0.950 density) and 30% isobutylene rubber.

•

Removal of quotas on U.S. imports of lead and zinc by the Tariff Commission was requested by the Mexican mining industry last week.

Testifying at commission hearings, Jose Campillo, president of the Mining Chamber of Mexico, declared that continuation of existing import restrictions would hurt the U.S. industry as well as mining industries in other countries.

Increased tariffs, he said, would hurt U.S. miners, since it would force many products out of the market, as well as encourage the use of lower-priced materials.

Campillo proposed that all lead and zinc producers would benefit through the stimulation of consumption in the marketplace and by international cooperation to prevent oversupply of the metals.

SELECTED PRICE CHANGES—WEEK ENDING JANUARY 18, 1960

	Change	New Price
UP		
Coconut oil, crude, tanks, Pac. Coast.	$0.0025	$0.1825
Palm oil, clarif., dms,	0.0025	0.1475
Peanut oil, crude, tanks	0.0075	0.14
DOWN		
Castor oil, imported, No. 1, Braz., tanks	$0.00125	$0.17625
Cocoa butter, bgs.	0.01	0.60
Eucalyptus oil, NF, rectified 70-75%, dms.	0.01	0.47

All prices per pound unless quantity is quoted.

Which of these 3 products and services can you use from BECCO?

TECHNICAL BULLETINS DESCRIBING H_2O_2

We got 'em—
You can have 'em—
They're FREE!

Years of experience in working with Hydrogen Peroxide have produced a wealth of information on this valuable compound, its properties, and reactions. Much of this information is available virtually exclusively from Becco. We've compiled a number of Technical Bulletins, which are yours free on request. Simply decide which ones you want, and mail the coupon below.

No. 2—Hydrogen Peroxide (general information)

No. 41—Becco H_2O_2 35% HP (high purity)

No. 42—Becco H_2O_2 35% Formula D (for preparing dilute solutions)

No. 46—Concentrated H_2O_2 (over 50% concentration)

No. 70—Becco Hydrogen Peroxide SP "100" (Super Pure, of virtually 100% concentration.)

Where can you use these *other* Becco PEROXIDES?

By "other", we mean "Other than Hydrogen Peroxide". Lots of otherwise knowing people labor under the impression that Becco makes only H_2O_2. Actually, there are quite a few "other" useful peroxides in Becco's catalog, some of which are especially suited to high-temperature oxidation reactions.

Look over the list below. Give you ideas? Remind you of a problem you've got? Either way, a note to Becco will bring you more information. Or, use the handy coupon.

UREA PEROXIDE—for use in hair dyeing and cold waving, disinfectants, hypo eliminators, and as a source of water-free H_2O_2.

SODIUM CARBONATE PEROXIDE—for compounding detergents and adhesives.

SODIUM PERBORATE—for use in dyestuff development, detergents, tooth-powders; as a mild bleaching agent and cold wave neutralizer.

CALCIUM PEROXIDE—for dough conditioning and in high-temperature oxidation reactions.

MAGNESIUM PEROXIDE—an antifermentative, for compounding antacids and laxatives.

ZINC PEROXIDE—for use as a disinfectant and deodorant in dusting powders, ointments, etc.

Emery Industries, Inc.

CARLISLE CHEMICAL WORKS, INC. READING, OHIO

ARGUS CHEMICAL

REICHHOLD

Over 100,000,000 pounds of plasticizers have been made with Becco proved-in-production epoxidation processes, using Becco H_2O_2!

Practically everyone who manufactures plasticizers is using a Becco epoxidation technique or a slightly modified version.

Since 1950 Becco has been foremost in research and development of the epoxidation of unsaturated fatty acid esters.

Take advantage of these years of experience. Write immediately, outlining your particular interest, or request a free copy of Becco Bulletin No. 69—"Epoxidation and Hydroxylation with Becco Hydrogen Peroxide and Peracetic Acid". Use the handy coupon below.

BECCO fmc

BECCO CHEMICAL DIVISION, FMC
Station B, Buffalo 7, New York
Dept. CW-M

Gentlemen:
Please send me the free Technical Bulletins checked below:

☐ #2 ☐ #41 ☐ #42 ☐ #46 ☐ #70

NAME_____

FIRM_____

ADDRESS_____

CITY_____

ZONE_____ STATE_____

BECCO fmc

BECCO CHEMICAL DIVISION, FMC
Station B, Buffalo 7, New York
Dept. CW-K

Gentlemen:
Please send me

☐ Becco Bulletin No. 1—"Active Oxygen Chemicals".

☐ Detailed information on _____

NAME_____

FIRM_____

ADDRESS_____

CITY_____

ZONE_____ STATE_____

BECCO fmc

BECCO CHEMICAL DIVISION, FMC
Station B, Buffalo 7, New York
Dept. CW-N

Gentlemen:
Please send me a free copy of Becco Bulletin No. 69.

NAME_____

FIRM_____

ADDRESS_____

CITY_____

ZONE_____ STATE_____

Explore new ideas with CONOCO WHITE OILS!

At one time white mineral oils were used almost exclusively in drug and cosmetic manufacturing. Today the chemical industry is discovering that Conoco white oils possess outstanding characteristics that suit them to dozens of new uses. Conoco white oils are inert, colorless and come in a Saybolt viscosity range of 500 to 40. Many manufacturers also find Conoco white oils an economical replacement for high-cost ingredients.

Here are just a few of the uses for Conoco white oils:

• **Plastics Manufacturing**—dispersants for colorants for polyethylene; replace butyl stearate to make polystyrene whiter and impart better flowability for extruding; provide a high sheen for polyvinylchloride electrical wire insulation; excellent internal lubricant for plastics.

• **Compressor Lubricants**—polyethylene and urea compressors; any compressors where lubricant contamination has been a problem.

• **Metal Hydrides**—facilitate suspension of metal hydrides in organic syntheses.

• **Textile Manufacturing**—reduce friction drastically, cutting down fiber breakage; leave no color problems on the fiber.

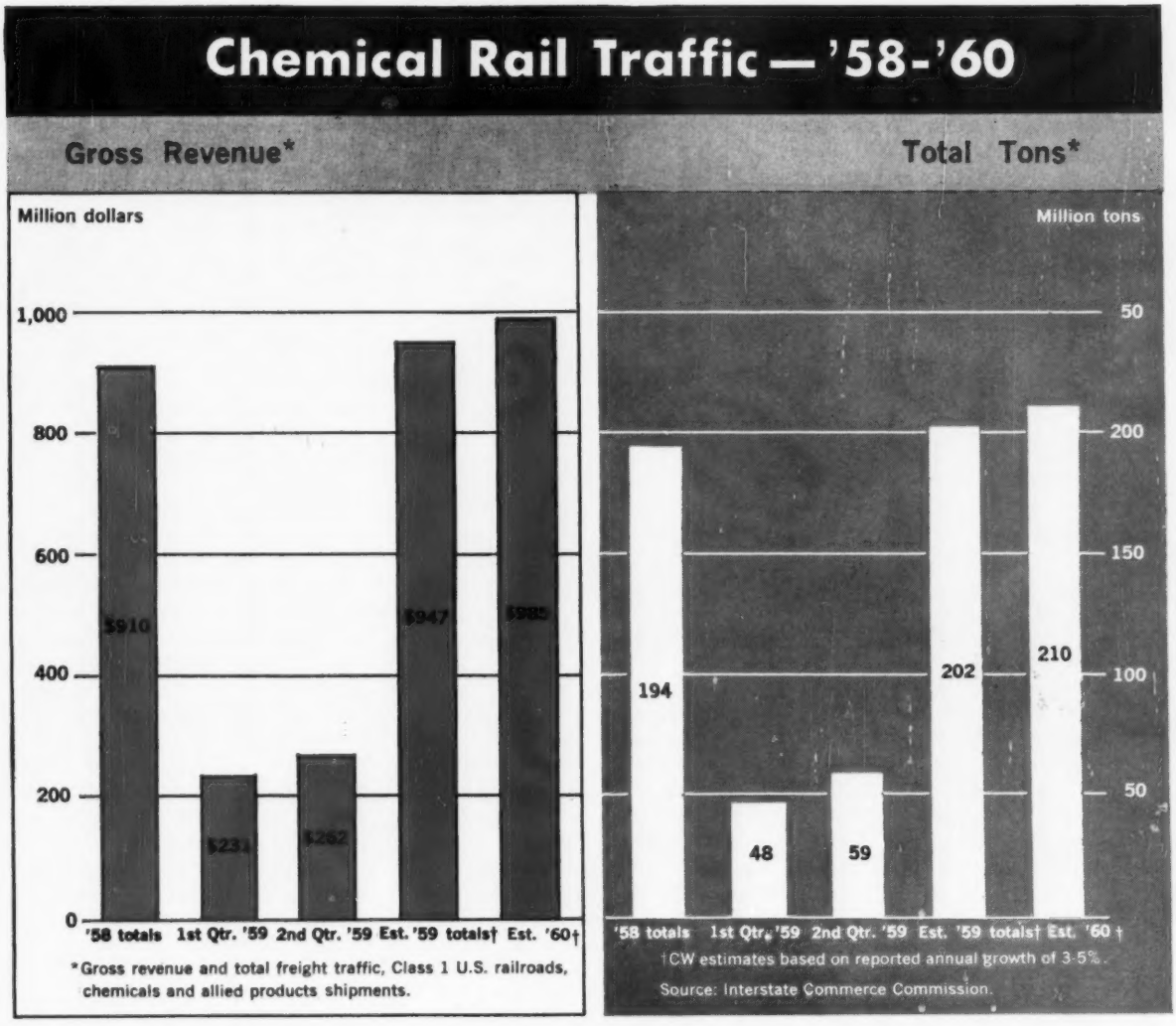
• **Catalyst Carriers**—because they are inert, Conoco white oils will not react with catalysts.

Find out how new uses for Conoco's RAMOL®, KREMOL® or STARLIGHT® white oils can provide a better answer to your problem. Write or call today. We'll be glad to supply you with samples and offer technical assistance.

CONOCO

Continental Oil Company, Petrochemical Dept., 1 West Forest Ave., Englewood, N. J., LOwell 8-8200

Chicago: Prudential Plaza, WHitehall 3-0944, New Orleans: Commerce Bldg., JAckson 2-0664, European Sales Offices: P.O. Box 1207, Rotterdam, The Netherlands



Rail Losses Spark CPI Distribution Gains

Despite their growth (graph, above), U.S. railroads are losing business to their chief foe, the highway motor carriers. This year, that competition may well result in substantial transportation savings for the chemical industries.

Likely benefits: more favorable rates, greater emphasis on service resulting from agreed rates, piggybacking, containerization, "jumbo-size" rail cars and other innovations.

Here's where the railroads stand. In terms of total business, they can expect an annual growth of 3-5%, but this rate is well behind that of other key industries (e.g., sales of chemicals and allied products have increased an average of 7%/year, doubling every 10 years, are expected to increase 10% in '60). Rail executives figure they can count on the 3-5% growth because they now have their rates more realistically pegged to the growth line. Says Edgar Hill, chairman of Traffic Executive Assn.-Eastern Railroads, "If we can hang together for three or four years, we will grow 25%, be able to stand competitively with any type of carrier. I think, from the technical standpoint, we've lost all we should."

The reams of statistics on rail freight show how the industry's growth has not kept pace, in ton-miles, gross freight revenue or average revenue per ton, with that of the truckers.

In ton-miles, a preferred benchmark for comparing carrier business, the railroads dropped 0.9% in '58 from '57 (*see table, p. 80*). And, rail executives expect '59 figures to show a similar, or more drastic, drop. In comparison, truckers and other types of motor vehicles registered a 2% gain in ton-miles for the same period.

In '55, U.S. railroads handled an estimated 30 million tons of chemicals of all types. Average revenue per ton was approximately $15; aver-

Downhill Route for Rail Traffic

Carrier	Volume of intercity traffic, public and private: Ton-Miles (billions) '57	Ton-Miles (billions) '58	Percent of Total '57	Percent of Total '58
Railroads and electric railways, including express and mail	626.2	558.7	47.2	46.3
Motor vehicles, total	244.9	247.0	18.5	20.5
Inland waterways, including Great Lakes*	231.8	189.0	17.5	15.6
Pipelines (oil)	222.7	211.3	16.8	17.5
Airways (domestic revenue, pleasure and business, including express and mail)	0.6	0.6	0.04	0.05
Totals	1,326.2	1,206.6	100.0	100.0

*Does not include coastwise and intercoastal deep-sea ton-miles estimated by ICC at 278.7 billion in '55, 274.4 billion in '56, 268.4 billion in '57.
Source: Preliminary estimates by Interstate Commerce Commission.

age loading was 37 tons/car. In '58, gross revenue from chemicals was $138.1 million and total freight traffic was 19.5 million tons (including duplications). Average revenue: $7.08/ton. Average loading was 35.8 tons/car. Since the per-car revenue on chemicals traditionally has been more attractive than that from practically all other commodity classes, this drop indicates the extent to which total rail business declined.

Still another index that indicates a dropoff in rail freight business, despite the industry's appearance of slight growth, is the measurement of the transportation industry's share of national income. In '57, railroads' total income was $7.4 billion, compared with $4.9 billion for highway freight (including transportation and warehousing). These figures represented 2% and 1.3%, respectively, of the total national income of $364 billion. In '56, rails had received 2.2% of the national income; highway freight carriers, 1.3%; in '53, 2.5% and 1.2%; in '50, 2.9% and 1.1%.

Rail Action: Says Hill, "We're doing everything we can to stop the trend of business going from the railroads to the truckers."

Action by the railroads is varied, widespread and significant to CPI shippers traditionally looking to rails for movement of chemicals and allied products. A rundown of railroads' plan of attack looks like this:

- Piggybacking — truck trailers carried on flatcars by rail to a given destination, unloaded and pulled by tractor the rest of the trip. This method of transportation is being encouraged by railroads, offers a versatility beyond that available with either rail or trucks alone.
- Containerization — coordinated transport of commodities, frequently via several modes of transportation, using "families" of cargo-carrying units. It's considered by many shippers as the major hope for cutting steadily mounting distribution costs. Railroads are pushing use of containerization because it permits lower rates through volume shipping. Shippers also benefit from reduced packaging and crating costs, less damage and pilferage and faster service through quicker loading, unloading and turnaround.
- Agreed, or contract, rates—rewarding manufacturers (by granting lower rates) that ship a specified percentage of freight over a stated time with a specific carrier. Generally, any chemical that moves in bulk and that is subject to handling by competitive carriers is open to agreed rates. The concept is just catching on, but it will be offered more often by the railroads. Drawbacks: it's certain that the roads will want strings attached in exchange for agreed rates; and the whole problem will have to be fought out in Interstate Commerce Commission hearings, because the law is less than clear on this point.

Rail Freight Rates: A major problem in the railroads' battle to survive has been freight rates. In March '56, the roads were granted a 6% general increase in rates, with certain holddowns (there were no holddowns for chemicals). In Aug. '57, the roads again raised charges—14% in the East, 12% in the West, 9% in the South—and again with no chemical holddowns. In Sept. '58, there was a highly selective increase of 2-3%, with rates on chemicals being hiked 3% across the country.

It's widely felt that the rapid series of increases has not brought the railroads expected revenue. In fact, one rail spokesman figures the last two rate hikes were a mistake: "We ended up, in most cases, by making adjustments on long or short hauls to get back some of the business we lost when we raised the rates. We're back, generally, to the '49 level of revenue per ton-mile."

Most observers feel that there will not be a rail-freight rate hike this year. Even if a strike, or threats of a strike (Feb.-April '60 will be the critical period of strike threats and harassing walkouts) force the roads to raise wages, observers say, an increase isn't likely.

Chemical Views: CPI traffic managers applaud the competition between rival carriers. They consider it healthy, but they're quick to add that they wouldn't want to see any carrier be hurt seriously. Said one spokesman, "A monopoly by any one carrier would be bad for everyone, especially if the monopoly were government controlled."

It's an all-out struggle against the gains made by highway carriers, as far as the railroads are concerned. Rail management sees improvement ahead, if the roads do everything possible to attract and hold shippers. For CPI concerns, this competition means lower rates, better service—all contributing to the CPI's efforts to cut mounting distribution costs.

INDUSTRY'S LARGEST AND MOST MODERN POLYVINYL ALCOHOL PLANT, ON STREAM EARLY IN 1960

VINOL POLYVINYL ALCOHOL

From Airco's 20 million-pound-per-year plant at Calvert City . . . ● VINOL in nine grades, each tailored to meet your needs for processing and formulation ● VINOL for coatings . . . binders . . . sizing . . . textiles . . . paper . . . emulsions . . . available through Air Reduction Chemical Company. ● VINOL for adhesives . . . available through *Colton Chemical Company,* Division of Air Reduction Company, Inc., 1747 Chester Avenue, Cleveland, Ohio. • For technical information on VINOL, write today.

AT THE FRONTIERS OF PROGRESS YOU'LL FIND . . .

AIRCO®

AIR REDUCTION CHEMICAL COMPANY

A division of Air Reduction Company, Incorporated

150 East 42nd Street, New York 17, N. Y.

Represented Internationally by Airco Company International

Sulfur Dioxide

ANSUL

REFRIGERATION PRODUCTS
FIRE FIGHTING EQUIPMENT
INDUSTRIAL CHEMICALS

An oxiding *and* reducing agent . . . acidifying *and* neutralizing agent.

Because it's so reactive, Ansul sulfur dioxide finds use in annealing glass, in Tellurium and Selenium recovery, in bleaching sugar. In the food industry, paper, textiles, petroleum. Perhaps we can put our knowledge—gained through 40 years of working with SO_2—to work for you. For sample quantities, our latest technical bulletins or problem-solving consultation, please write.

Property Data	
Molecular Weight	64.06
Specific Gravity	
Liquid.....Water=1@0°C (32°F)	1.434
Gas.....Air=1@0°C & 760 mm	2.2636
Melting Point..(−103.9°F)	−75.5°C
Boiling Point..(14°F)	−10.0°C
Refractive Index	
Liquid....(I.C.T. 1, 107)....n20°/D (68°F)	1.410
Gas (Mellor, J.W. Vol. X, 197) n15°/D (59°F)	1.000686

ANSUL CHEMICAL COMPANY • MARINETTE, WISCONSIN

1959—A Big Year for Trademarks

- Record number of tradename changes filed.
- Second-largest number of registrations in a single year.
- Trademark information "clearing house" set up by U.S. Trademark Assn.
- Special study launched by the association on feasibility of registering proposed trademarks.
- Legislation to permit single registration of trademarks for all Benelux countries considered by Dutch Parliament.

CPI Leads Trademark Trend

The steel industry revealed a new promotional campaign last week aimed at countering increasingly stiff competition from plastics and aluminum. The industry's latest move is to put greater reliance on trademarks and tradenames and to build this campaign around a symbol called the "Steelmark."

For chemical process industries, the move is gratifying as recognition of a technique in which the CPI has become a leader.

Last year was a particularly big one for CPI trademark and name activity. Industry trademark changes set a record, with Pennsalt Chemicals Corp. changing from Pennsylvania Salt Manufacturing Co., Allied Chemical Corp. taking over from Allied Chemical & Dye Corp.; Texaco, Inc. arising from The Texas Co., Union Carbide Corp. superseding Union Carbide & Carbon Corp.

Moreover, chemical process companies took the lead in informing their customers how to use, and avoid misusing, trademarks in '59. (Most chemical products are sold to other industrial companies for further processing into consumer products. Thus, the CPI, more than most other industries, suffers from indiscriminate trademark use by its customers.) Minnesota Mining and Manufacturing Co. and Gulf Oil Corp., for example, prepared manuals on proper trademark usage for their customers, while Du Pont and American Cyanamid distributed manuals on how customers should comply with the new Textile Fibers Identification Act.

Of course, '59 was an active trademark year all around. As business picked up following the recession, trademark applications and registrations topped '58 levels by sizable margins (see table). Registrations by the U.S. Patent Office of new trademarks reached a near-record total of 18,320 (record year was '56, when 20,758 trademarks were granted). Trademark applications last year totaled 23,064, well below the postwar '48 flood of 35,100 applications.

Trademarks Abroad: Companies looking abroad—particularly to western Europe—for profit opportunities with adequate trademark protection can find encouragement in progress made overseas last year. Among the several developments:

- The Dutch Parliament is considering a bill that would permit a single registration to be effective for all three Benelux countries (Belgium, The Netherlands, Luxemburg).
- Italy and Iceland agreed on reciprocal protection for their trademarks.
- Norway adopted the International Trademark Classification for the first time.

U.S. Progress: With the upswing of business in '59 and '60, trademark activities have maintained a brisk pace, likely will move even faster. In response to these growing needs, the U.S. Trademark Assn. last year inaugurated several new activities. One of the most significant was a special study to determine the

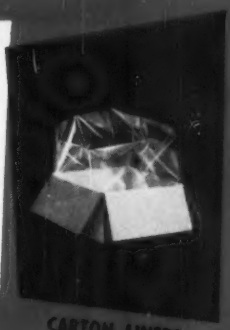
PROTECTIVE'S

DRUM LINERS ★ BAGS ★ CARTON LINERS

ALL STYLES • ALL SIZES
Produced with finest materials:
POLYETHYLENE, VINYL, LAMINATES
The largest manufacturer in the U.S.A.
concentrating on ROUND bottom and
STRAIGHT bottom LINERS . . . the FINEST!

DRUM LINERS

BAGS


CARTON LINERS

*Double-Seal Guaranteed Safety . . .

SUCCESS!

LOW, LOW, PRICES!

"TWIN-SURE" DOUBLE-SEAL
straight bottom liners

"POWER-SEAL"
round bottom liners

. . . originated and manufactured by the pioneers in plastic-liners for steel drums, fibre containers, cartons and boxes . . . successfully tested and proven satisfactory for protective packaging by many of America's leading manufacturers, processors and laboratories.

. . . here are just a few users of protective liners:

Allied Chemical & Dye Corp.
The Borden Company
Brookhaven National Laboratories
C-O-TWO Fire Equipment Company
E. I. duPont de Nemours & Co.
Endicott Johnson Corp.
General Electric Company
McKesson & Robbins, Inc.
National Lead Company
Chas. Pfizer & Co., Inc.
Swift & Company
Union Carbide & Carbon Corp.
U. S. Quartermaster Corps

Guaranteed Satisfaction
Free Consultation
Free Samples

Write Dept. CW-10

PROTECTIVE LINING CORPORATION

GENERAL OFFICES AND PLANT: 22 WOODHULL STREET, BROOKLYN 31, NEW YORK

RC was there...

Looks like pure magic – but it's pure science. Behind the fine performance of a plastic garden hose lies the expertness of **RC** research. Before your extrusion faces consumer use, we test and retest. And our work is not finished until your basic product incorporates those essential qualities that insure best possible product performance. **RC** Plastisols, Plasticizers, Comonomers, and Insular Vinyl Polymers and Copolymers can be utilized in a vast range of applications. We invite your inquiries for advice, technical bulletins and samples. Whether we have the final answer in stock or we come up with a modified or custom-made formula, the quality and performance of your product will prove . . . **RC** was there!

Now available: New booklets on "RC Plasticizers and Comonomers," "Insular Polymers and Copolymers."

READY . . . RELIABLE . . . RC SERVING AMERICAN INDUSTRY SINCE 1930

RUBBER CORPORATION OF AMERICA

New South Road, Hicksville 5, N. Y. Sales Offices: New York • Akron • Chicago • Boston

SALES

feasibility of amending the Landrum Act to allow registering of proposed trademarks before they are approved for use by the Patent Office.

Another arm of the association's activities concerns distribution of trademark information. A clearing house for trademark information was begun in '59. And the group also publishes literature intended to do the same job. Examples: a "do's and don'ts" leaflet, and a comprehensive manual, "Trade Mark Management: A Guide for Businessmen."

Look for '60 to bring more CPI tradename changes and greater attention to trademark protection, the result of efforts to gain more product recognition, steal the march on the competition.

DATA DIGEST

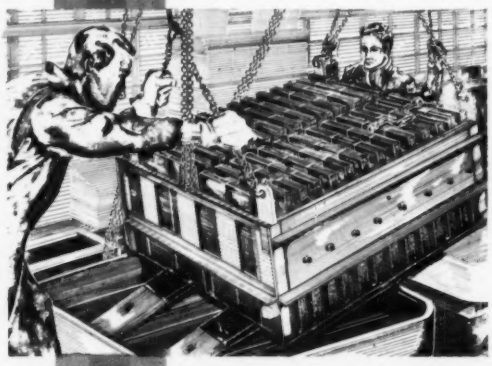
• **Organic Chemicals:** New edition of a 28-page booklet describes properties, applications and shipping data of more than 400 synthetic organic chemicals, including alcohols, anhydrides, acids, chlorine compounds, fluorocarbons, ketones, nitrogen compounds and surfactants. Union Carbide Chemicals Co. (New York).

• **Product Index:** New edition of product index lists company's products alphabetically and by class. Among them: phenol and substituted phenols, fused-ring heterocycles, pyridine and its derivatives, and hydrocarbons. Reilly Tar & Chemical Corp. (Indianapolis, Ind.).

• **Plasticizers:** A 32-page catalog (L-104) describes company's line of plasticizers. Charts and tables discuss properties, specifications, applications and compatibility with various resins. Also included: description of film preparation for testing, test methods for film evaluation, guide to plasticizer selection. Eastman Chemical Products, Inc. (New York).

• **Sulfur Handbook:** A new looseleaf manual outlines basic data relating to sulfur production, shipping, handling and use. Four sections provide data on properties and analysis; shipping molten sulfur, handling and storing molten material, and a general review of the sulfur industry. The manual is illustrated with pictures, graphs and charts, also contains a bibliography of sulfur literature. Addenda will be published. Texas Gulf Sulphur Co. (New York).

AN IMPORTANT MESSAGE FOR ELECTROLYTIC CELL OPERATORS



Extra dividends in the form of increased cell operating economies are now available to users of GLC Anodes.

These dividends have been developing during the past several years as a result of exchanges between GLC engineers and those of GLC customers.

Among the results, depending upon the requirements of the individual electrolytic cell operator, are longer anode life, longer diaphragm life, reduced power consumption, and reduced labor costs.

As you know, it takes months to translate technical objectives into anode characteristics—and many months more to check on the results of these changes in cell operations.

The time has now come when the hoped-for results are actually being achieved by GLC Anode customers.

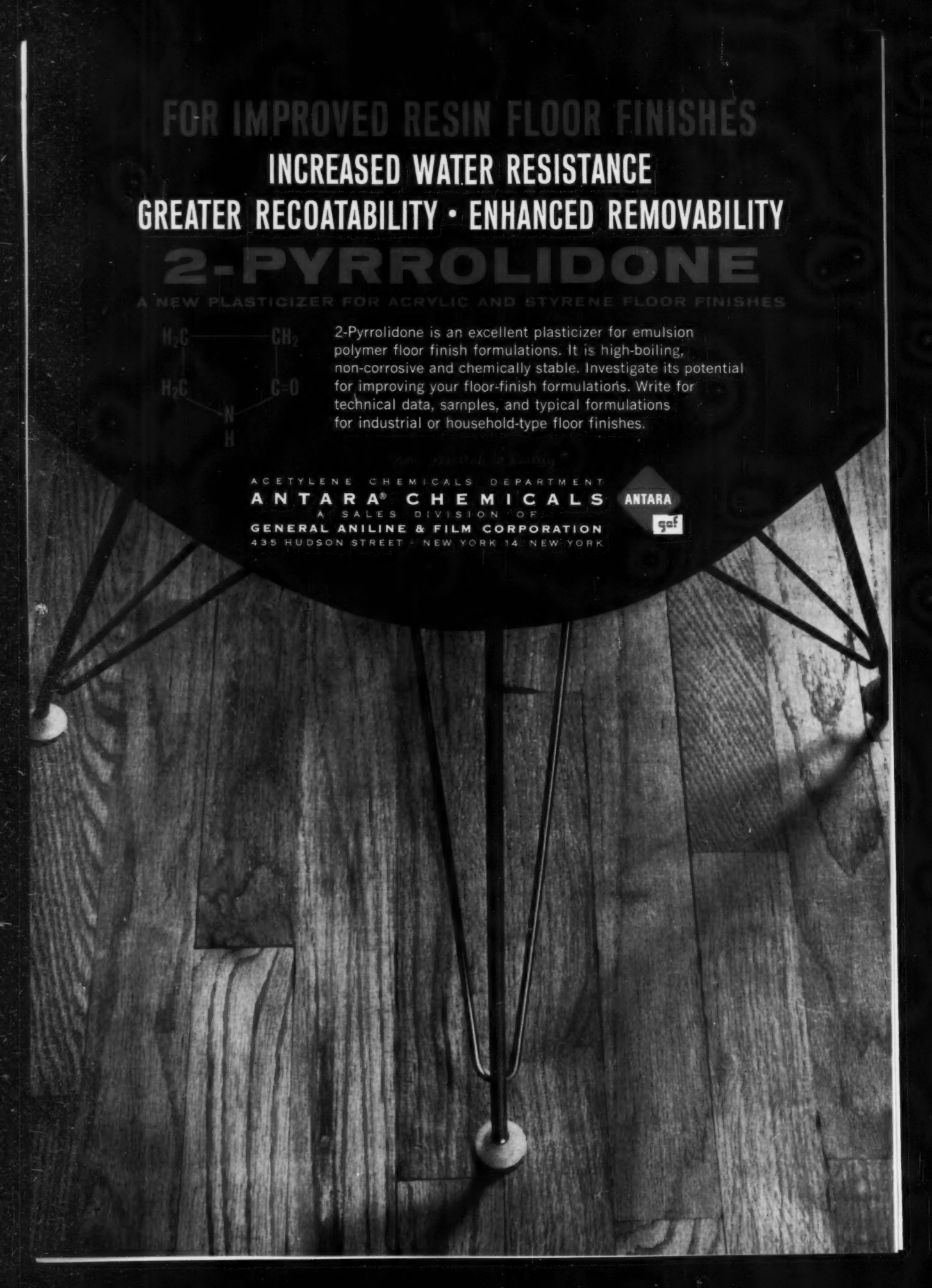
If you, as an electrolytic cell operator, are not as yet fully informed about the GLC program of technical exchanges with GLC Anode customers, and the results of this program which are now becoming evident, we will be happy to furnish such information to you.

We feel sure you will find these facts a profitable step forward in improving the operating efficiency of your electrolytic cells also.

PRODUCTS ELECTRODE GLC DIVISION YOU CAN TRUST

GREAT LAKES CARBON CORPORATION

18 EAST 48TH STREET, NEW YORK 17, N. Y. OFFICES IN PRINCIPAL CITIES


FOR IMPROVED RESIN FLOOR FINISHES
INCREASED WATER RESISTANCE
GREATER RECOATABILITY • ENHANCED REMOVABILITY
2-PYRROLIDONE
A NEW PLASTICIZER FOR ACRYLIC AND STYRENE FLOOR FINISHES
2-Pyrrolidone is an excellent plasticizer for emulsion polymer floor finish formulations. It is high-boiling, non-corrosive and chemically stable. Investigate its potential for improving your floor-finish formulations. Write for technical data, samples, and typical formulations for industrial or household-type floor finishes.
ACETYLENE CHEMICALS DEPARTMENT
ANTARA® CHEMICALS
A SALES DIVISION OF
GENERAL ANILINE & FILM CORPORATION
435 HUDSON STREET · NEW YORK 14, NEW YORK
ANTARA
gaf

Trends to Watch in Weed Control

- More use of granular materials, including use on aquatics, due to development of better application equipment.
- Increased interest in water-in-oil ("invert") emulsions for aerial applications of materials such as 2,4-D and 2,4,5-T.
- More use of herbicide combinations — e.g., simazine and aminotriazole for guard rail clearing, and Dinatro and Alanap for potatoes.
- Increased emphasis on pre-emergent chemicals, such as simazine, atrazine, Eptam and Randox, for full-season protection with single applications.
- Decreased cultivations beyond once or twice a season, due to long-lasting effects of newer herbicides.

Herbicide Makers Set Fast Pace for '60

First extensive reports on two new crabgrass control chemicals (one to be sold commercially this year); late word on the growing popularity of granular herbicides; up-to-date data on the potentialities of so-called "invert" emulsion. These conference highlights helped draw 600 representatives of the farm chemical business to New York last week.

The occasion was the 14th annual meeting of the Northeastern Weed Control Conference in New York's New Yorker Hotel.

The new crabgrass control chemicals are Dow's Zytron and Diamond Alkali's Dacthal. Dow's material, primarily a pre-emergent, is chemically O-(2,4-dichlorophenyl) O-methyl isopropylphosphoramidothioate, is formulated as an emulsifiable concentrate, 2 lbs. of ingredient in 1 gal. of water, or it can be applied to an inert carrier such as vermiculite or clay, dispensed as a granular material. Dow claims a single pre-emergence application of 20 lbs./acre provides season-long control of crabgrass. Postemergence applications appear to indicate that the product might have some systemic seed-killing effect.

Diamond Alkali's Dacthal, also a pre-emergent, is chemically dimethyl 2,3,5,6-tetrachloroterephthalate. A product of joint research by Diamond Alkali and Boyce Thompson Institute, it's closer to commercialization than the Dow material, will be offered to the consumer this year by Swift under the brandname Rid. For turf, 10-12 lbs./acre of the product is recommended.

The results given at the conference showed little difference between the relative effectiveness of the Dow and Diamond Alkali materials. A few papers seem to indicate there might be a little less turf damage from Zytron, but Dacthal seems to have the edge by being somewhat cheaper both in the pound cost of material and in use cost (because of its lower application rate).

Under-the-Rail Sales: Based on the work that was done in spraying around highway guide rails, signs and posts in '59, there's bound to be increased interest in the use of the weedkiller combination of aminotriazole (for quick "knockdown") and Simazine (for residual effect). Used at a two-to-one ratio, the present practice favors an application rate of 6-12 lbs./acre of active material. In its guide-rail work, the state of New York figures that cost/mile (counting material labor and equipment) was about $24. Although not the cheapest method tested, it gave the best results, required no touch-up hand mowings.

Heavy attention paid at the meetings to use of granular materials indicates that it's one of the big trends in herbicides use. Although there are some cases in which the granular material proves more effective than other forms, the real impetus toward using granular products—even where it means higher materials cost—comes with ease of application. Farmers claim it's generally easier for them to handle herbicides in this form (less water to haul) and that they

are able in many cases to combine seeding, fertilizing and herbicidal applications.

It's this convenience factor that is stimulating the search for good pre-emergence granular herbicides. Also a factor in the development of granular products is their growing use by gardeners.

Waterlogged? Little new in the field of herbicides for aquatic weeds was reported at last week's meeting. The work that has been done lately has largely been attempts to get granular forms that will hold together until they get to the root systems of submerged plants.

Dow is currently offering a new formulation of Silvex (2,4,5-trichlorophenoxy propionic acid) for experimentation for aquatic use, calls its new material M-1500. Also being given some play as an aquatic herbicide is Pennsalt's Endothal (disodium salt of 3,6 endoxohexahydrophthalic acid).

Switch Hitter: Although there's still more talk on the subject than action, it's apparent that invert emulsions—especially for aerial applications—will get wider use in such applications as right-of-way spraying. These are two-phase, water-in-oil emulsions in which droplets of the inner-water phase are surrounded by a continuous outer phase of oil containing the active herbicide. Used in aerial spray, these heavy emulsions are less subject to drift and thermal current interference than are conventional emulsions.

Amchem Products, as well as others, has formulated several new products in this form. Among them: Trelease (a butoxy ethanol ester formulation of 2,4,5-T for hardwoods); Envert DT (a butoxy ethanol ester formulation of 2,4-D plus 2,-4,5-T in a 50/50 mixture for mixed brush, especially where conifers are a problem); and Envert 2,4,5-T (for mixed brush, especially where red maple and ash are predominant).

There's been an acceleration of progress in weed-control compounds in the last year (Monsanto's Avadex and Spencer's Carbyne for wild oats are examples of major breakthroughs). Corridor talk at the meeting indicated further gains in the coming year. And chemical companies are sure to rake in more as the farmer has less to hoe.

New Laminate

Competition for melamine laminates in the furniture and panelboard fields is coming up strong in the form of a new, highly protective laminate tradenamed Daponite. The newcomer was shown off in these household uses by Food Machinery and Chemical Corp.'s Chemicals and Plastics Division during the recent winter furniture displays in Chicago.

The laminate is based on FMC's diallyl phthalate resin. The firm sells only the unformulated powder to paper coaters and laminators, who will turn out the Daponite. FMC has been marketing the resin for industrial uses since the mid-'50s. One use: as an electrical insulating base in rockets.

The big advantage of Daponite, according to FMC, is that it will allow use of cheaper furniture cores. The laminate is said to cure at the relatively low temperature of 350 F and at pressures of 100-250 psi., while melamine types need temperatures of 300 F and pressures up to 1,000 psi. A broader range of natural woods may be used in laminating, since their physical characteristics would be unaffected by the process.

Possible Markets: The resin is expected to sell for about 85¢/lb. for most laminating applications, with the use-quantity ranging between 0.04 and 0.08 lbs./sq.ft. FMC sees the market for Daponite developing first in institutions (hospitals, cafeterias, schools), next in the table and flat-surface furniture business, and then in the case-goods market (buffets, dressers). The entire laminate market is estimated at $400 million.

Although the resin will be more expensive than some other plastics, the advantage of using cheaper wood and eliminating overlayers should make the resulting finish 35-40% less costly than other plastic laminates currently used, says FMC.

Triple Play in Paint

Three major paintmakers, W. P. Fuller (San Francisco), Canadian Industries Ltd. (Montreal) and Patterson-Sargent Co. (Cleveland) are making extensive changes in their corporate makeup.

Fuller has revealed that its international operations will be expanded by integration with long-established domestic companies in Europe, Latin America and Asia. In Europe, Fuller is integrating its operations with Vernis Claessens S.A. of Antwerp, Belgium.

In South America, Fuller Panama has entered into a joint venture to build and operate a paint factory in Guatemala. A new company, Fuller y Cia de Centro America S.A., will serve Fuller customers in Guatemala, El Salvador, Honduras, Nicaragua and Costa Rica. In Asia, Fuller & Co. Ltd., has been incorporated in Tokyo. The company will acquire 50% of the total stock issued by Mitsui Fuller Ltd., an operating company formed in cooperation with Mitsui Bussan Kaisha, Ltd. of Japan.

The European operation, the most ambitious of the moves, is an arrangement (worked through W. P. Fuller & Co., a wholly owned Fuller subsidiary in Zug, Switzerland) whereby the Antwerp company will manufacture a full line of automotive aircraft and industrial finishes under the Fuller and Nason labels, and will also continue the Claessens lines.

Canadian Industries Ltd., second-largest paint company in Canada, has acquired virtually full control of Brandram-Henderson Ltd., one of Canada's long-established paint houses. With the acquisition, CIL adds a "second" line of paints to its list, greatly expands its franchised dealer organization by adding the independent outlets franchised by Brandram-Henderson, and acquires plants in Halifax, Montreal and Vancouver to add to its present Montreal and Toronto plants.

CIL will continue to operate Brandram-Henderson as a separate company, although the initial deal gives it control of 97% of B-H stock. Remaining publicly held stock will also come to CIL if stockholders accept an offer CIL is now preparing.

R. B. Winsor, vice-president of CIL, has been named president of Brandram-Henderson, and D. W. Shales, currently CIL secretary, is vice-president and general manager. Existing sales forces of both companies will remain intact; each will sell its separate line.

Patterson-Sargent Co., manufacturer of BPS paints, was acquired by H. K. Porter Co. (Pittsburgh), diversified manufacturer of steel, rubber and electrical equipment. Porter purchased

The 20th Century Genie

HARSHAW FLUORIDES

Harshaw first started to manufacture hydrofluoric acid in 1904. Today, Harshaw's Fluoride Division produces 26 different fluoride chemicals for as many industries.

In addition to

BORON TRIFLUORIDE

HYDROFLUORIC ACID—Aqueous-Anhydrous

there is a long list of other fluoride chemicals. If necessary, you are invited to draw on the experience of our staff of technical specialists.

THE HARSHAW CHEMICAL CO.

1945 East 97th Street • Cleveland 6, Ohio

Chicago • Cincinnati • Cleveland • Detroit • Hastings-On-Hudson
Houston • Los Angeles • Philadelphia • Pittsburgh

HARSHAW ALSO SUPPLIES:

- Ammonium Bifluoride
- Ammonium Fluoborate
- Barium Fluoride
- Bismuth Fluoride
- Boron Trifluoride
- Boron Trifluoride Complexes
- Chromium Fluoride
- Copper Fluoborate
- Fluoboric Acid
- Fluorinating Agents
- Frosting Mixtures
- Hydrofluoric Acid Anhydrous
- Hydrofluoric Acid Aqueous
- Hydrofluosilicic Acid
- Laboratory Fluorine Cells
- Lead Fluoborate
- Lithium Fluoride
- Metallic Fluoborates
- Potassium Bifluoride
- Potassium Chromium Fluoride
- Potassium Fluoborate
- Potassium Fluoride
- Potassium Titanium Fluoride
- Silico Fluorides
- Silicon Tetrafluoride
- Sodium Fluoborate
- Tin Fluoborate
- Zinc Fluoborate
- Zinc Fluoride

over 90% of Patterson-Sargent's stock. P-S sales were around $10 million in '59. There are two plants, one in Cleveland, another in Long Island City, N.Y. Porter will continue to sell the paints under the BPS trademark.

No Rush on TBA Bill

Auto chemicals makers who are looking for help from Rep. James Roosevelt's (D., Calif.) talked-about bill to bar giant oil companies from handling TBA items may have a long wait.

Roosevelt, who heads the House Small Business Subcommittee, heard complaints last month from auto wholesalers and service station dealers that major oil companies forced them to sell only the TBA items (tires, batteries, accessories) that the oil companies sponsored.

A typical complaint to the committee came from a Georgia service station operator who claimed his oil supplier forced him to switch brands of antifreeze. Roosevelt's proposed bill would prohibit this.

Meanwhile this week, the committee was in the process of drafting the bill, but no real decisions have been made as to contents. Roosevelt has talked about the bill in general terms but specific details have yet to be worked out. Probable reason for the committee's vagueness: the bill hasn't much chance to pass this year.

Light Up a Liederkranz

Romano and Parmesan cheeses, of all things, hold promise as cigarette filters, says University of Wisconsin biochemist Henry Lardy.

The findings concerning effectiveness of the improbable filtering agent didn't stem from work in cigarette research, but came from studies aimed at finding new markets for cheese.

The U. of W. professor of biochemistry has been experimenting with the cheese filters at the request of Stuart M. Stebbings, a De Pere, Wis., business man, and has found that a combination of cheese and charcoal removed 90% of the tars from cigarettes. He contends that this is about 30% better than the job done by most commercial filters.

Lardy says that the fat and protein materials in cheese are natural absorbents of the substances in smoke tars. He has found that a one-third-charcoal-two-thirds-cheese filter works best, that the cheese used must have 20-40% butterfat.

When cheese was first tested, Lardy says, it absorbed only 40% of the tars, and it made the paper greasy. Addition of charcoal solved the greasiness problem by absorbing oil, and boosted the tar absorbtion to 90%. Lardy says the cheese apparently removes nicotine in percentage equal to that of the tar removed.

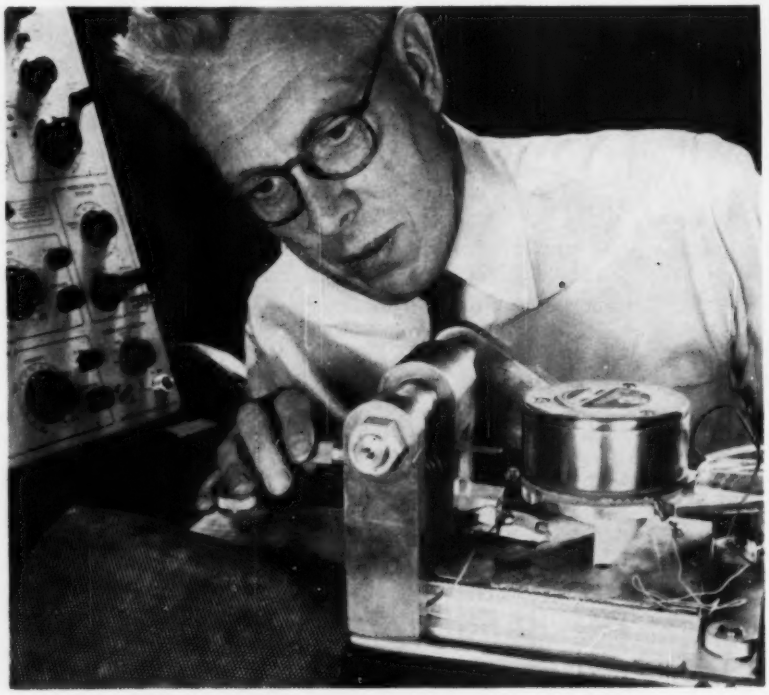
Stebbins adds that U.S. cigarette makers haven't shown much interest in the idea but that foreign manufacturers have.

Caviar Conflict

One indication that West Germany means business in enforcing its new food additives law (*CW, Jan. 9, p. 87*) was the German disclosure last week that it was outlawing Russian caviar.

One of the regulations included in the additives law bars the import of any food preserved in boric acid, in which the Russian delicacy is packed. (Boric acid is also prohibited as a food preservative in the U.S.)

The German Ministry of Interior reportedly asked the Soviets to find a substitute for the chemical, but the



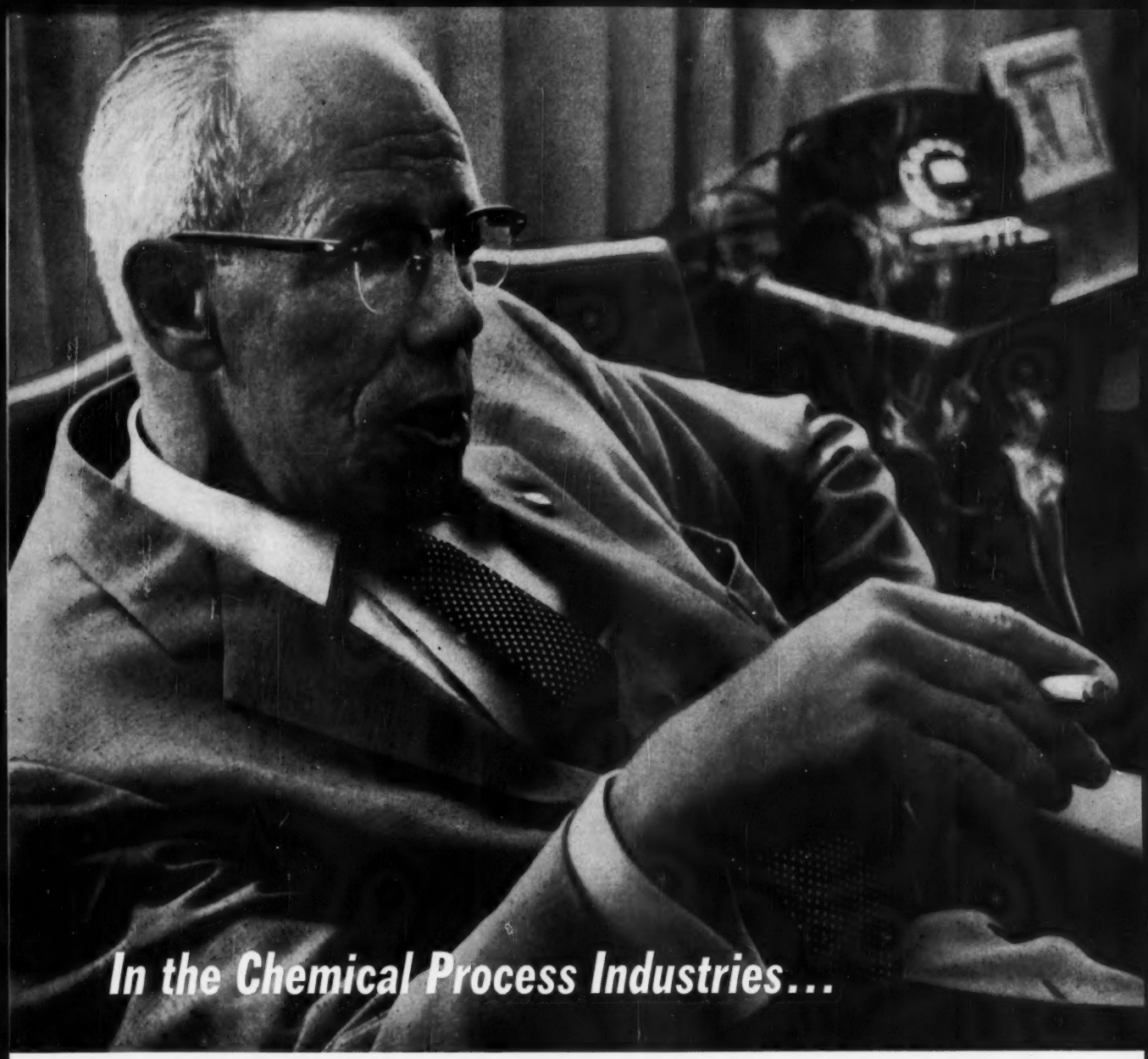
Boat Coat Revolution in the Making?

The practice of coating boat hulls may undergo a major change, and the need for conventional marine hull paints may lessen sharply. These possibilities arise as a result of development of a skin coating for boats by U.S. Rubber.

Fitzhugh Boggs (*photo above*) heads a USR project that is examining boat hull drag reduction with a neoprene hull envelope—said to be modeled on the principles of a porpoise skin—that ensures a laminar flow of water around a boat's body.

The neoprene skin is separated from the hull by tiny rubber pillars (the material looks somewhat like the rubber surfacing on ping-pong paddles); the space around the pillars is filled with a viscous, free-flowing liquid such as a silicone.

Although the company is currently suggesting the coating might well be used on submarines and similar large vessels, it might also find use as an internal coating for pipelines. So far, however, the product is not commercially available, and merchandising plans are at least a year off. USR has patent applications in 19 countries.



YOUR MARKET IS A MANAGEMENT MAN

Common sense tells you this . . . so do buying influence studies. Today the "bosses" – from department heads in lab, pilot plant and full-scale production right up to top brass in the front office – are more concerned than ever with what's being bought. CPI-Management are acutely aware that more modern equipment, materials and services provide one of the big solutions to profit problems. And boosting net profits is their job . . . management's responsibility alone! So, too, is management's responsibility to exercise the dominant voice in the purchase of your product. That's why . . .

Your first, most important advertising job is to sell them in the CPI's most essential busines paper . . . in CHEMICAL WEEK, the only magazine edited exclusively for and sold selectively to CPI-Management – *at all levels, in all functions, both technical and non-technical.* **30** full-time editors . . . over **42,000** *all-paid* circulation . . . read, preferred and subscribed to *independently* by more management men than any other CPI magazine . . . with 600-plus advertisers who place more display pages here than in any other "process" weekly. Your product should be here, be seen, *be sold* . . . in CHEMICAL WEEK!

and you can sell him in...

A McGRAW-HILL PUBLICATION

Chemical Week

CHEMICAL WEEK • ADVERTISERS' INDEX

January 23, 1960

AIR REDUCTION CHEMICAL CO. 81
Agency—G. M. Basford Co.

*ALLIED CHEMICAL CORP., NITROGEN DIV. 20
Agency—G. M. Basford Co.

*ALLIED CHEMICAL CORP., SOLVAY PROCESS DIV. ..... 2nd cover
Agency—Kastor, Hilton, Chesley, Clifford & Atherton, Inc.

*AMERICAN AGRICULTURAL CHEMICAL CO., THE 11
Agency—Marsteller, Rickard, Gebhardt & Reed, Inc.

AMERICAN MINERAL SPIRITS CO. 43
Agency—Leo Burnett Co., Inc.

AMOCO CHEMICAL CORP. 8-9
Agency—D'Arcy Advertising Co.

ANSUL CHEMICAL CO. 82
Agency—The Brady Co., Inc.

ATLAS POWDER CO. 48-49
Agency—Aitkin Kynett Co.

*BECCO CHEMICAL DIV. OF FOOD MACHINERY & CHEMICAL CORP. 77
Agency—John Mather Lupton, Inc.

*BERKSHIRE CHEMICALS, INC. 56
Agency—Givaudan Advertising Inc.

BIRD MACHINE CO. 45
Agency—Walter B. Snow & Staff, Inc.

BUFFALO FORGE CO. 67
Agency—Melvin F. Hall Adv., Inc.

CHEMICAL WEEK 91

CHICAGO BRIDGE & IRON CO. 19
Agency—Russell T. Gray, Inc.

*CONTINENTAL OIL CO. 78
Agency—Benton & Bowles, Inc.

DELHI-TAYLOR OIL CORP. 53
Agency—Sam J. Gallay, Adv.

DISTILLATION PRODUCTS INDUSTRIES, DIV. OF EASTMAN KODAK CO. 12
Agency—The Rumrill Co., Inc.

DOW CHEMICAL CO., THE (SARAN LINED PIPE) 50
Agency—MacManus John & Adams, Inc.

DIXON CHEMICAL & RESEARCH, INC. .. 2
Agency—Ray Ellis Adv.

DOW INDUSTRIAL SERVICE DIV. OF THE DOW CHEMICAL CO. 1
Agency—Rives, Dyke & Co., Adv.

*DUPONT DE NEMOURS & CO. INC., E.I., FREON PRODUCTS DIV. 24
Agency—Batten, Barton, Durstine & Osborn

ELLIOTT CO. 63
Agency—Downing Industrial Adv., Inc.

*EVANS CHEMETICS INC. 55
Agency—Ritter, Sanford, Price & Chalek, Inc.

GENERAL AMERICAN TRANSPORTATION CORP. 58
Agency—Edward H. Weiss & Co.

GENERAL ANILINE & FILM CORP. 86
Agency—L. W. Frohlich & Co.

GENERAL MILLS, INC. 33
Agency—Knox Reeves Adv. Inc.

GOULDS PUMPS, INC. 30
Agency—The Rumrill Co., Inc.

GREAT LAKES CARBON CORP. 85
Agency—Davis-Parsons & Strohmeier Adv.

HARSHAW CHEMICAL CO. 89

HUISKING & CO., CHARLES L. 4-5
Agency—G. M. Basford Co.

*JEFFERSON CHEMICAL CO. 71
Agency—Robinson-Gerard-McGary, Inc.

*LITHIUM CORP. OF AMERICA 74
Agency—Hazard Adv. Co., Inc.

MCGRAW-HILL BOOK CO. 73

MISSISSIPPI LIME CO. 54
Agency—Ridgway Advertising Co.

NATIONAL CARBON CO., DIV., UNION CARBIDE CORP. 13
Agency—William Esty Co.

OLIN MATHIESON CHEMICAL CORP. 40
Agency—Doyle, Kitchen & McCormick, Inc.

PENNSYLVANIA DEPT. OF COMMERCE .. 38
Agency—Bachman, Kelly & Trautman, Inc.

PFAUDLER DIV. PFAUDLER PERMUTIT, INC. 6-7
Agency—The Rumrill Co., Inc.

POWELL CO., THE WILLIAM ..... 3rd cover
Agency—The Ralph H. Jones Co.

PROTECTIVE LINING CORP. 83
Agency—Allan Rock Adv. Agency

PUBLICKER INDUSTRIES, INC. 14-15
Agency—Al Paul Lefton Co.

RAYMOND BAG CORP. 46
Agency—Western Adv. Agency

*REICHHOLD CHEMICALS, INC. 57
Agency—MacManus, John & Adams, Inc.

RHODIA, INC. 10
Agency—Sudler & Hennessey, Inc.

RUBBER CORP. OF AMERICA 84
Agency—Ovesey & Straus, Inc.

SCIENTIFIC DESIGN CO. ..... 4th cover
Agency—Michel Cather, Inc.

SHELL OIL CO. 64
Agency—J. Walter Thompson Co.

*TENNESSEE CORP. 72
Agency—Crawford & Porter, Inc.

*TRUBEK LABORATORIES, THE 37
Agency—Ray Ellis Advertising

UNION CARBIDE CHEMICAL CO. DIV. OF UNION CARBIDE CORP. 39
Agency—J. M. Mathes, Inc.

UNITED STATES BORAX & CHEMICAL CORP. 61
Agency—Howard M. Irwin & Assoc.

U. S. INDUSTRIAL CHEMICALS CO., DIV. NATIONAL DISTILLERS & CHEMICAL CORP. 17-18
Agency—G. M. Basford Co.

VANDERBILT CO., R. T. 56
Agency—Pearsall & Schael

*VITRO ENGINEERING CO. 23
Agency—Molesworth Associates

*WYANDOTTE CHEMICALS CORP. 47
Agency—Brooke, Smith, French & Dorrance, Inc.

tracers SECTION

(Classified Advertising)

F. J. Eberle, Business Mgr.

BUSINESS OPPORTUNITY 93
CHEMICALS WANTED 93
EMPLOYMENT 93
EQUIPMENT: Used/Surplus New For Sale 93
PROFESSIONAL SERVICES 93
SELLING OPPORTUNITIES Offered/Wanted 93

ADVERTISING STAFF

Atlanta 3 ..... Michael Miller, 1301 Rhodes-Haverty Bldg., JAckson 3-6951

Boston 16 .. Paul F. McPherson, 350 Park Square Building, HUbbard 2-7160

Chicago 11 ..... Alfred D. Becker, Jr., R. J. Claussen, 520 N. Michigan Ave., MOhawk 4-5800

Cleveland 13 .. H. J. Sweger, Duncan C. Stephens, 1164 Illuminating Bldg., 55 Public Square, SUperior 1-7000

Dallas 1 .. Gene Holland, Gordon Jones, The Vaughn Bldg., 1712 Commerce St., Riverside 7-5117

Denver 2 ..... J. Patten, 1740 Broadway, ALpine 5-2981

Detroit 26 ..... H. J. Sweger, Jr., 856 Penobscot Bldg., WOodward 2-1793

Frankfurt/Main ..... Stanley Kimes, 85 Westendstrasse, Germany

Geneva, Switzerland .. Michael R. Zeynel 2, Place du Port, Geneva, Switz.

London E.C. 4 .. E. E. Schirmer, McGraw-Hill House, 95 Farringdon St., England

Los Angeles 17 ..... Robert Yocom, 1125 West Sixth St., HUntley 2-5450

New York 36 ..... Knox Armstrong, B. A. Johnson, P. E. McPherson, Charles F. Onasch, L. Charles Todaro, 500 5th Ave., OXford 5-5959

Philadelphia 3 .. William B. Hannum, Jr., 6 Penn Center Plaza, LOcust 8-4330

Pittsburgh 22 ..... Duncan C. Stephens, Room 1111 Henry W. Oliver Bldg., EXpress 1-1314

San Francisco 4 .... William C. Woolston, 68 Post St., DOuglas 2-4600

St. Louis 8 ..... R. J. Claussen, 3615 Olive St., Continental Bldg., JEfferson 5-4867

*For complete product data see catalog unit in the BUYERS' GUIDE ISSUE for 1959-60

Russians don't seem to be interested in following the suggestion.

"Russian caviar is demanded all over the world," a Russian is said to have responded. "If the Germans don't want it, that's their tough luck."

New Vitamin Sellers

A person with impaired hearing may soon go into a hearing aid store, be fitted with the electronic aid—then given a sales pitch for vitamins. Sonotone Corp. (New York), a major supplier of electronic hearing aids (beginning Feb. 1), will test-market its own brand of vitamins, called Sonomin, in 30 of its 350 offices. The products will be offered in two forms; one, for "those under 50," will be a diet supplement; the other will be a geriatric-type formula. Initially, the product will be offered in packages of 30 and 100 tablets. Price schedules are still pending. Sonotone won't disclose who is supplying its vitamins, says only that it's an "old, established Midwest drug company."

Shine to Shoe Polish

S. C. Johnson & Son (Racine, Wis.) has joined the ranks of Revlon and Ronson as recent entries into the shoe polish business. Trade observers regard it as another step in the industry's evolution, in which the business will be dominated by well established marketers that can afford big national advertising budgets.

Next month Johnson will begin extensive test marketing of its new elegantly packaged polish in Ohio. Selling under the Johnson brand-name, the polish will come in four lines: paste, scuff coat, self-polishing, and white. (The white is a separate line because of different formulation and applicator.) There will be three basic colors: brown, black and white.

The paste line will be packaged in a 2½-in. high can, containing a small cake applicator and shine cloth. The other lines are packaged in a high-density polyethylene container shaped like a dumbbell. To apply, the consumer holds the container upside down and presses applicator tip against the shoe. This opens the valve and wets the applicator, eliminates the dip-type stick on conventional self-polishing products.

All lines retail for 49¢.

Tracers

TO THE CHEMICAL PROCESS INDUSTRIES

ADDRESS BOX NO. REPLIES TO: Box No. Classified Adv. Div. of this publication. Send to office nearest you.
NEW YORK 36: P. O. BOX 12
CHICAGO 11: 520 N. Michigan Ave.
SAN FRANCISCO 4: 68 Post St.

POSITION VACANT

Regional Chemical Sales Manager for Midwest to be located in Dallas. Chemical Degree and experience essential. Opportunity for advancement. Please send résumé to Personnel Director; Delhi-Taylor Oil Corporation; 823 Corrigan Towers; Dallas, Texas.

Assistant Plant Manager. For small ultra modern food processing plant in New Orleans area. Must be graduate Chemical Engineer with minimum of three years production experience. Excellent opportunity for advancement in a new, challenging industry with a well established firm. Address replies, stating qualifications and salary requirements to P.O. Box 26398 New Orleans 26, La.

Chemist — Internationally known expanding company manufacturing specialized chemical products for the foundry and steel industries invites application for the following position: Senior Research Chemist—Applicants should preferably be under 35, must have a Ph. D. or equivalent in chemistry and at least 5 years experience in Research and Development work. Evidence of high ability in previous employment will be necessary and experience in leading a Research team would be an advantage. The position is one of considerable responsibility and the successful candidate must be capable of initiating and directing project activity after a period of training. This position represents a substantial opportunity for the right man with the probability of rapid advancement. A good starting salary commensurate with experience will be paid. Applicants should submit a résumé of qualifications and experience to: Foundry Services, Inc., P.O. Box 8728, Cleveland 35, Ohio.

Sales Manager — Plastics. Progressive custom formulator located in Southeast seeking Sales Manager with experience, initiative and imagination. Specific experience in plastisols desirable. Give full details of background and salary requirement. P-3499, Chemical Week.

Dixon Chemicals has the following openings at its New Jersey plants: Plant Engineer—M.E. or Ch. E. Department Superintendent—M. E. or Ch. E. Chemist—B. S. Experience in sulfuric acid, hydrofluoric acid, or aluminum sulfate production desired, but not necessary. Reply in confidence with salary requirements to: Dixon Chemical & Research, Inc., 330 Doremus Avenue, Newark, New Jersey, ATTN: Mr. Thomas B. Davis.

SELLING OPPORTUNITY AVAILABLE

Technical Sales Representative: Expanding sales program of Vitro Chemical Company offers a challenge and opportunity in the mid-west for outstanding personal accomplishment to the right man. Products include metal salts for the metal finishing and chemical industries. Vitro also markets rare earth chemicals and thorium compounds for a variety of new and intriguing applications. If you are interested in becoming a member of a new group, with a bright future in the progressive Vitro family, please send a resume of your experience, education and salary requirements to General Sales Manager, Vitro Chemical Company, 630 Third Avenue, New York 17, N.Y.

Mfg'ers Reps calling on Industrial Jobbers wanted to represent eastern mfg'er of stainless steel screwed pipe fittings. Sales commission. Choice territories avail. Advise of current lines. RW-3525, Chemical Week.

WANTED

Small laboratory furnace for temps up to 2500°C either atmosphere or vacuum. W-3488, Chemical Week.

POSITION WANTED

Senior Chemical Engineer—Manager 16 yrs management and technical background of plant operations. R & D and process engineering. Widely varied organic and inorganic experience. Active AEC and military "secret" clearances. "Can handle any responsible position in a C.P.I." PW-3366, Chemical Week.

International—American with European experience and excellent general knowledge of European chemical industry wants position in Europe or U.S. with International Division of chemical company. Well qualified to do market research or follow latest European research and development advances. Currently in Europe. French and German. Twelve years experience in chemical industry. PW-3516, Chemical Week.

Foreign operations. Widely travelled and experienced chemical sales executive available. Worldwide commercial and Government connections. Resume and references. PW-3480, Chemical Week.

SELLING OPPORTUNITY WANTED

Manufacturers Representation, CPI Specialist. Now serving two leading equipment manufacturers wishes to add one more line that can be sold to the processing industries. Concentration and penetration coverage of Metropolitan N. Y. City—New Jersey, Eastern Pennsylvania and Baltimore area is assured. If you have a reputable product, we can increase your sales at low cost. RA-3514, Chemical Week.

BUSINESS OPPORTUNITY

Internationally known British merchant house specializing chemicals/plastics field seeks European agency arrangements with United States suppliers; would also consider manufacturing proved products in Europe under license or partnership in similar venture advertiser's representative will be visiting America in February/March 1960 and suggests any interested persons contact BO-3497, Chemical Week. All replies treated in strict confidence.

PROFESSIONAL SERVICES

"In Engineering, it's the People that Count." Engineers and Contractors for the Petroleum and Chemicals Industries. The C. W. Nofsinger Co., 307 East 63rd St., Kansas City 13, Mo.

FOR SALE

DBS Plast., Virgin Bulk 35¢. Barium Hydrox. N.F. (J. T. Baker Orig.) 15 Leverpaks $.06/lb. Triethylene Glycol Dicaprylate 10 drums $.18/lb. **Toluol 10,000 gals. $.20/gal. Type "S"** Anti-Freeze **$.39/gal. (in drums). 2 orig. drs.** Polyethylene Gly. 1000, Monostearate $.20/lb 3 orig. drs. Barrett Pyidine 15A $.35/lb. O/S 2000 gls mixed Phthalate-Phosphate Plasticizer 20¢ lb O/S 500 gls TCP Plasticizer 20¢ lb. 3 drs-Isoprene-Enjay virgin 15¢. Ohio Apex KP23 Plasticizer, orig. drs. 12¢ lb. FS-3452, Chemical Week.

Buflovak 5' x 12' single drum vacuum dryer, complete, never used, never installed. Perry Equipment Corp., 1415 N. 6th St., Phila. 22, Pa.

Combustion Engineers 2200 gal. T316 stainless reactor, vacuum int., jacketed, turbine agitator. Perry, 1415 N. 6th St., Phila. 22, Pa.

Send for revised up-to-date illustrated circular on our $3,000,000 chemical plant liquidation at Orange, Texas. Type 316 stainless equip. Perry, 1415 N. 6th St., Phila. 22, Pa.

For Sale—16—8100-gal. cap. ea. "Lastiglas" lined horizontal tanks, price 10¢ per gal. f.o.b. truck shipping point, buy one or more, inspection invited. FS-3464, Chemical Week.

For Sale—150 HP package-type steam generator in closed food plant Michigan, automatic oil burner and all controls, still erected. FS-3457, Chemical Week.

For Sale—Diatomaceous earth filter with "Niagara" stainless riveted leaves, 160 sq. ft. area. FS-3460, Chemical Week.

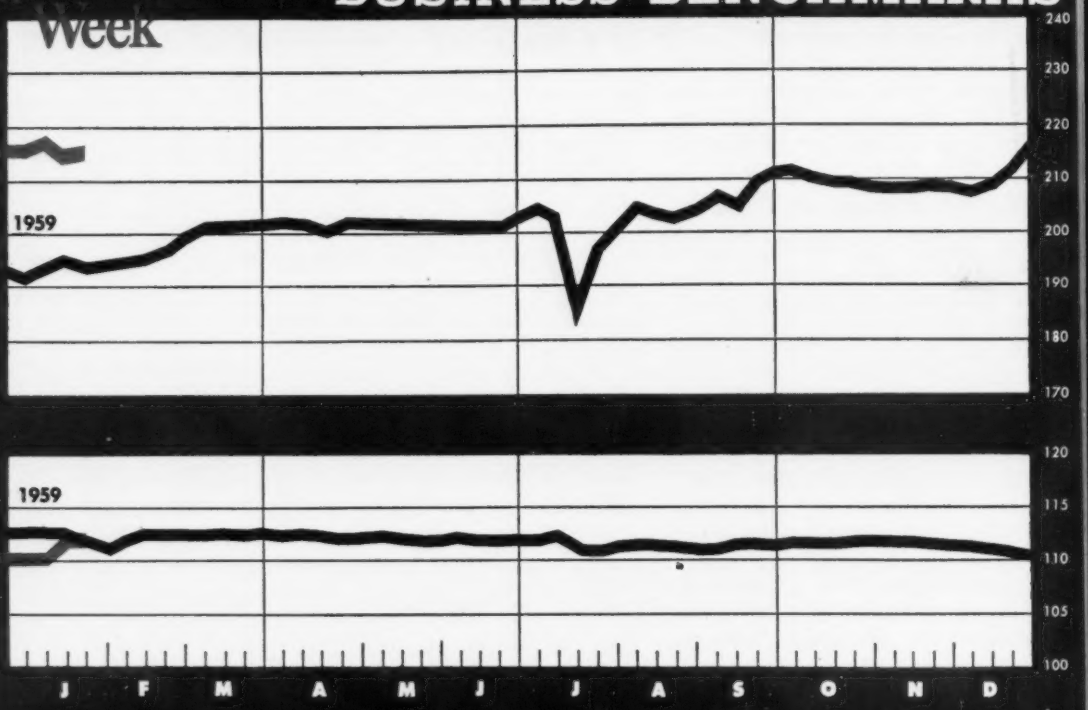
For Sale—"Alvey" automatic pelletizing machine, new 1954, cost new around $30,000, can ship immediately at less than half price, ideal for oil, chemical packages, etc. FS-3469, Chemical Week.

New opportunities for special chemicals in the paper industry. New York appointments arranged in late February. Descriptive bulletin on request. Gorham Laboratories, Inc., Gorham, Maine.

CHEMICALS WANTED

Surplus Wanted—Chemicals, Pharmaceuticals Oils, Acids Plasticizers, Resins, Dyes, Solvents, Pigments Etc. Chemical Service Corporation, 96-02 Beaver Street, New York 5, N. Y. HAnover 2-6970.

BUSINESS BENCHMARKS

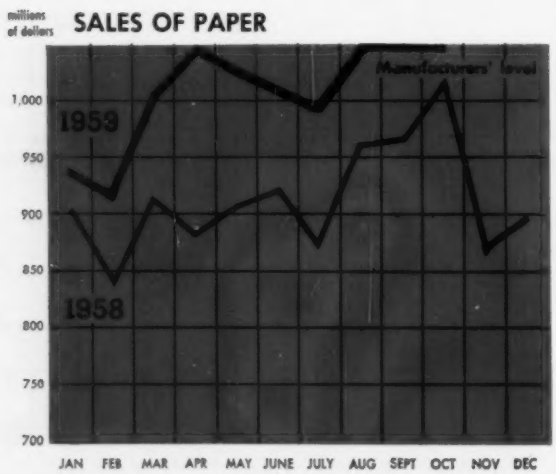


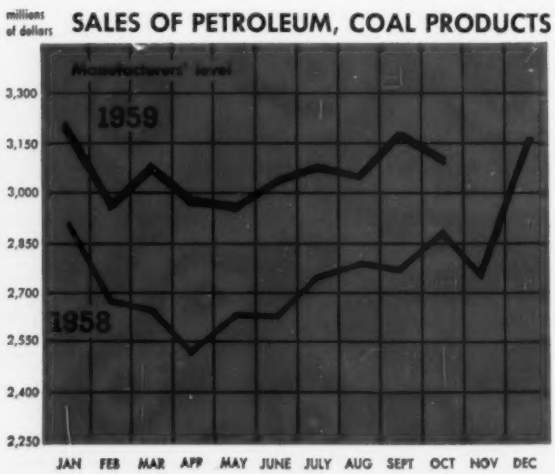
JANUARY 23, 1960

WEEKLY BUSINESS INDICATORS	*Latest Week*	*Preceding Week*	*Year Ago*
Chemical Week output index (1947-1949=100)	216.5	216.0	194.0
Chemical Week wholesale price index (1947=100)	112.6	112.6	111.9
Stock price index (12 firms, Standard & Poor's)	59.92	60.88	49.40
Steel ingot output (thousand tons)	2,715	2,715	2,111
Electric power (million kilowatt-hours)	14,308	13,565	13,554
Crude oil and condensate (daily av., thousand bbls.)	7,112	7,067	7,052

EMPLOYMENT INDICATORS (thousands)	*Latest Month*	*Preceding Month*	*Year Ago*
All manufacturing	16,209	16,193	15,795
Nondurable goods	6,959	7,027	6,813
Chemicals and allied products	861.9	860.8	823.7
Paper and allied products	564.5	566.3	553.7
Rubber products	270.1	273.0	253.7
Petroleum and coal products	227.1	230.1	235.1

CHEMICAL CUSTOMERS CLOSE-UP





POWELL
CORROSION RESISTANT
VALVES

performance that makes a world of difference

The Powell Special Design and Alloy Valve Division was created to study and solve the flow control problems arising from the increasing number of corrosive fluids used in the Chemical and Process industries.

As a result, Powell has developed valves that can be depended upon for long, uninterrupted service under the most corrosive conditions; valves that require little maintenance; and that eliminate the possibility of contamination of end product.

Powell offers valves to handle practically every corrosive fluid—valves of every design and in the largest selection of metals and alloys. Contact your local Powell distributor. Or write or call us direct. Our consulting engineers are at your service.

Powell . . . world's largest family of valves

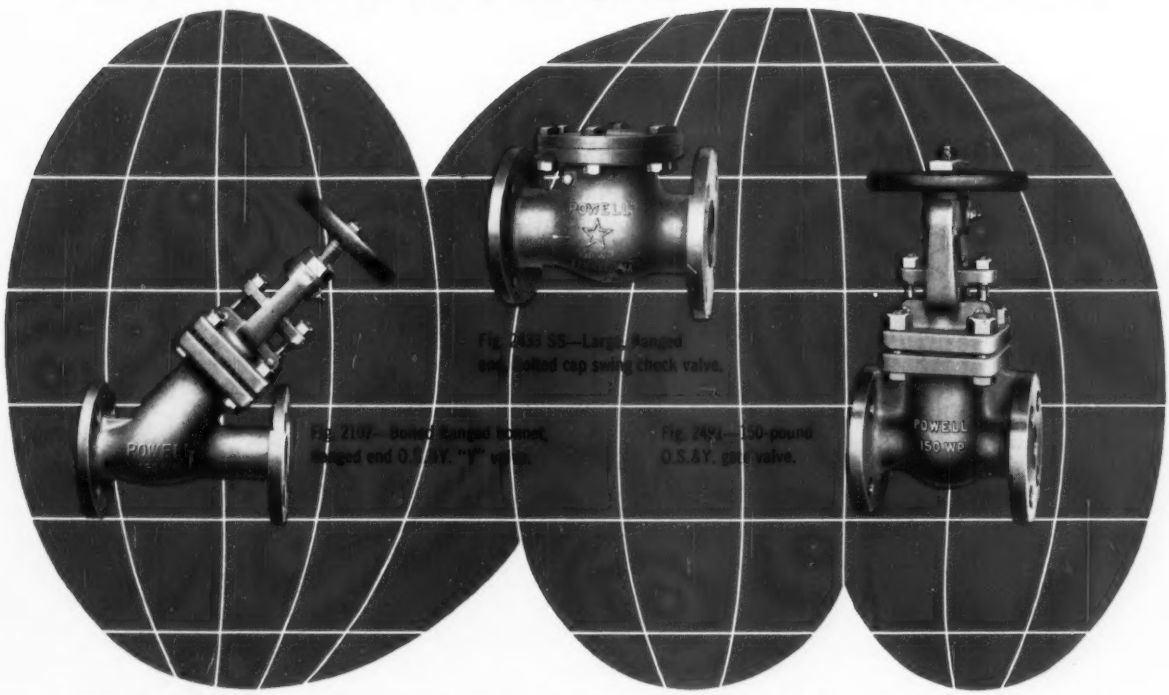


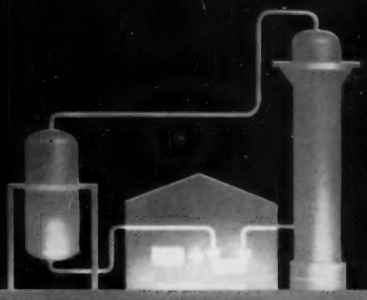
Fig. 2138 SS—Large flanged cast bolted cap swing check valve.

Fig. 2197—Bolted flanged bonnet, flanged end O.S.&Y. "Y" valve.

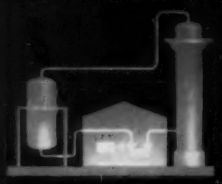
Fig. 2491—150-pound O.S.&Y. gate valve.

THE WM. POWELL COMPANY • DEPENDABLE VALVES SINCE 1846 • CINCINNATI 22, OHIO

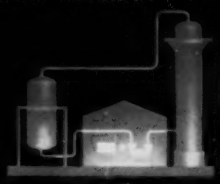
SD's New Model
ETHYLENE OXIDE PLANT
going on stream at
Mitsubishi Petrochemical Co., Ltd.
YOKKAICHI, JAPAN



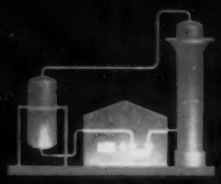
OTHER SD ETHYLENE OXIDE PLANTS



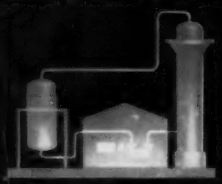
NAPHTACHIMIE
Lavera, France (4 projects)



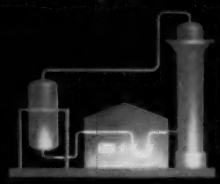
SOCIETE CHIMIQUE DES DERIVES DU PETROLE
Antwerp, Belgium (2 projects)



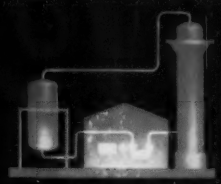
ERDOELCHEMIE G.m.b.H.
Dormagen, Germany (2 projects)



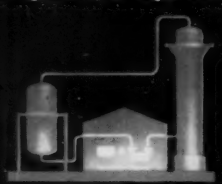
ALLIED CHEMICAL CORPORATION
Nitrogen Div., Orange, Texas



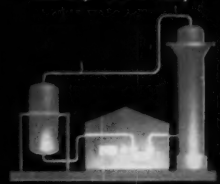
GENERAL ANILINE AND FILM CORPORATION
Linden, New Jersey



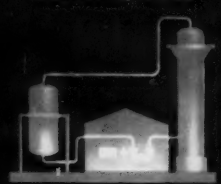
MARLES-KUHLMANN
Gonfreville, France



CHEMISCHE FABRIK HOLTEN G.m.b.H.
Ludwigshaven, Germany



MITSUI PETROCHEMICAL INDUSTRIES, LTD.
Iwakuni City, Japan (now doubling capacity)

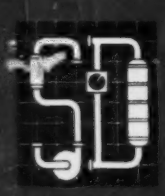


JEFFERSON CHEMICAL COMPANY
Port Neches, Texas

SCIENTIFIC DESIGN is the recognized leader in

ETHYLENE OXIDE
PLANT DESIGN

Scientific Design's new model ethylene oxide plant, just started up at Mitsubishi Petrochemical Company, Ltd., incorporates a number of new and efficient design features. These and other features, available in all new SD ethylene oxide plants, offer the **most favorable economics** and **best performance** of any ethylene oxide process.



SCIENTIFIC DESIGN COMPANY, INC.

EXECUTIVE OFFICES: TWO PARK AVENUE, NEW YORK 16, NEW YORK

THE SD GROUP:

SD Plants Inc., Two Park Avenue, New York 16, New York

SD Plants Ltd., Bush House, Aldwych, London WC 2, England

Catalyst Development Corporation, 59 Industrial Avenue, Little Ferry, New Jersey

Société Française des Services Techniques S. a. r. l., 52 Champs Elysees, Paris 8e, France